Actiontec®

# Wireless Broadband Router

**Model #: MI424-WR**

**Firmware Version: 4.0.16.1.45.120**

# User Manual

**Ver 1.1**

*Solutions for the Digital Life™*

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# Introduction 1

Thank you for purchasing the Actiontec Wireless Broadband Router. The Wireless Broadband Router supports Multimedia over Coax Alliance (MoCA), a new networking standard that allows digital entertainment and information to be transmitted and distributed to multiple devices over coaxial cables. The Router also supports Ethernet and Wi-Fi networking, making it the most versatile router available. If you want to take your home or office networking to the next level, the Actiontec Wireless Broadband Router is sure to be one of the keys to your success.

## Package Contents

- Actiontec Wireless Broadband Router
- Black Power cord
- Yellow cable (Ethernet, 6 ft.)
- White cable (Ethernet, 10 ft.)
- Quick Start Guide
- Installation Guide
- User Manual CD
- Wireless Networking Guide



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- Wall-mount template
- Vertical stand
- Warranty

## Minimum System Requirements

- Computer with Ethernet capability
- Microsoft Windows 98SE, Me, 2000, or XP; Mac OS 9 or greater; Linux/BSD, Unix
- Internet Explorer 5.0 or higher; Netscape Navigator 7.0 or higher
- TCP/IP network protocol installed on each computer

## Features

- Supports multiple networking standards, including:

  WAN - Ethernet and MoCA interfaces

  LAN - 802.11g, 802.11b, Ethernet, and MoCA

- Integrated wired networking with 4-port 10/100 Mbps Ethernet switch and MoCA
- Integrated wireless networking with 802.11g access point featuring:

  802.11g enabled to support speeds up to 54 Mbps wirelessly

  802.11b backward compatible, communicating with 802.11b wireless products at speeds up to 11 Mbps

- Enterprise-level security, including :

  Fully customizable firewall with Stateful Packet Inspection

  Content filtering with URL-keyword based filtering, parental control, customizable filtering policies per computer, and E-mail notification

  Denial of service protection against IP spoofing attacks, intrusion and scanning attacks, IP fragment overlap, ping of death, and fragmentation attacks

  Event logging



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Intrusion detection

MAC address filtering

NAT

DMZ hosting

Access control

Advanced wireless protection featuring WPA, WEP 64/128 bit encryption, 802.1x authentication, and MAC address filtering

ICSA certified

- Other Features

  DHCP server option

  DHCP server/PPPoE server auto-detection

  DNS server

  LAN IP and WAN IP address selection

  MAC address cloning

  Port forwarding

  PPPoE support

  QoS support (end to end layer 2/3) featuring Diffserv, 802.1p/q prioritization, configurable upstream/downstream traffic shaping, random early detection and pass-through of WAN-side DSCPs, PHBs, and queuing to LAN-side devices

  Remote management and secured remote management using HTTPS

  Reverse NAT

  Static NAT

  Static routing

  Time zone support

  VLAN multicast support

  VPN IPSec (VPN passthrough only)



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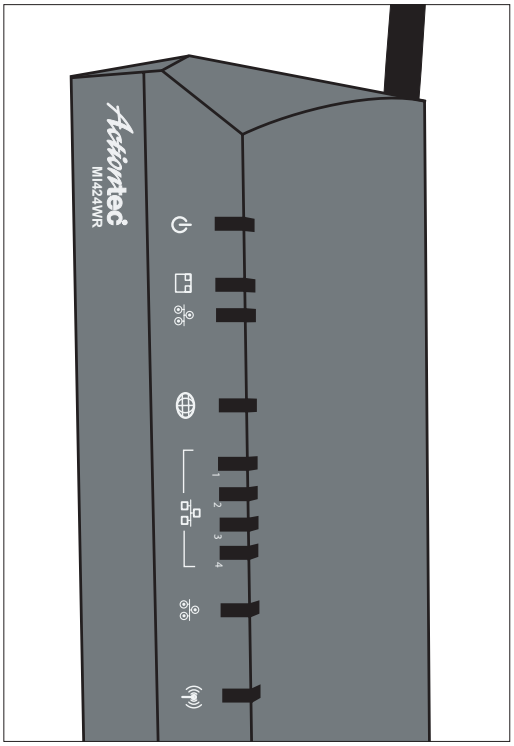
## Getting to Know the Router

This section contains a quick description of the Router's lights (LEDs), ports, etc. The Router features several indicator lights on its front panel, and a series of ports and switches on its rear panel.

### Front Panel

The front panel of the Router features ten indicator lights: Power, Ethernet WAN, Coax WAN, Internet, Ethernet LAN (4), Coax LAN, and Wireless.




#### *Power Light*

The Power light displays the Router's current status. If the Power light glows steadily green, the Router is receiving power and fully operational. When the Power light flashes rapidly, the Router is initializing. If the Power light is not illuminated or glows red when the Power cord is plugged in and the Power switch is turned on, the Router has suffered a critical error and technical support should be contacted.



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### *Ethernet WAN Light*

The Ethernet WAN light illuminates when the Router is connected to the Internet via Ethernet. If flashing, data traffic is passing across the port.

### *Coax WAN Light*

The Coax WAN light glows steadily or flashes when the Router is connected to the Internet via coaxial cable.

### *Internet Light*

When the Internet light glows steadily green, the Router is connected to the ISP (Internet Service Provider). If it glows amber, there is a physical connection to the ONT (Optical Network Terminator), but authentication has not taken place (i.e., no IP address is present).

### *Ethernet LAN Lights (1, 2, 3, 4)*

The Ethernet LAN lights illuminate when the Router is connected to a local network via one or more of its Ethernet ports. If flashing, data traffic is passing across the port(s).

### *Coax LAN Light*

The Coax LAN light glows steadily or flashes when the Router is connected to a local network via its Coax port.

### *Wireless Light*

The Wireless light illuminates when the Router's wireless access point is turned on. If flashing, data traffic is passing across the wireless connection.



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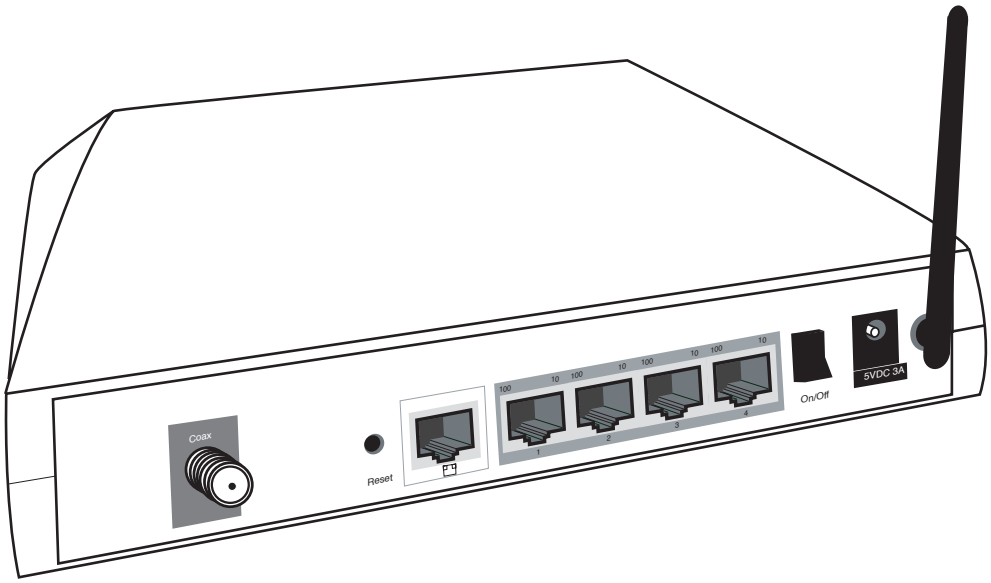
## Rear Panel

The rear panel of the Router features seven ports (Coax, Ethernet WAN, Ethernet LAN [4], and Power), as well as a Reset button and Power switch.




### *Coax Port*

The Coax port connects the Router to the ISP or other devices using a coaxial cable.

### *Reset Button*

To restore the Router's factory default settings, press and hold the Reset button for approximately ten seconds. The reset process will start about ten seconds after releasing the button. When the Router resets, all the lights on the front panel turn off, and then some of the lights start flashing. The Router has completed its reset process when the Power light glows steadily green.

***Caution***: Do not unplug the Power cord from the Router during the reset process. Doing so may result in the loss of the Router's configuration information. If this occurs, reset the Router again.



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### *Ethernet WAN Port*

The Ethernet WAN port connects the Router to the ISP using an Ethernet cable.

### *Ethernet LAN Ports (4)*

The Ethernet LAN ports connect devices to the Router via Ethernet cables to create a local area network (LAN). The Ethernet LAN ports are 10/100 Mbps auto-sensing ports, and either a straight-through or crossover Ethernet cable can be used when connecting devices to the ports.

### *Power Switch*

The Power switch powers the Router on and off.

### *Power Port*

The Power port connects the Router to an electrical wall outlet via the Power cord.



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# Connecting the Router 2

Connecting a computer or local network to the Wireless Broadband Router is a simple procedure, varying slightly depending on the computer's operating system but designed to seamlessly integrate the Router with the computer or local network. Moreover, addition configuration to access the GUI is not required when taking advantage of Universal Plug-and-Play support in Windows XP.
The Windows default network settings dictate that in most cases, the setup procedure described in the "Computer Network Configuration" will be unnecessary. For example, the default DHCP setting in Windows 2000 is "client," requiring no further modification.
However, Actiontec advises following the setup procedure described below to verify all communication parameters are valid and the physical cable connections are correct.

## Setting Up the Router

There are three parts to setting up the Router: Connecting the Cables, Configuring the Router, and Connecting Other Computers/Set Top Boxes.

### Connecting the Cables

☞ ***Note***: If a different router was being used, disconnect it. Remove all router components, including power supplies and cables, since they will not work with the Wireless Broadband Router.

1. Get the Router and black Power cord from the box.
2. Plug the black Power cord in the black port on the back of the Router and then into a power outlet.
3. Turn the Router on.
4. Make sure the Power light on the front of the Router is glows steadily green.
5. Plug the yellow Ethernet cable from the box into one of the four yellow Ethernet ports on the back of the Router.



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6. Make sure the computer is powered on, then plug the other end of the yellow Ethernet cable into an Ethernet port on the computer.

7. Make sure at least one of the Ethernet LAN lights on the front of the Router glows steadily green. This may take a few moments.

8. The phone company previously installed a high-speed wall jack somewhere in the house. Locate it and note its type (Ethernet or coaxial). If Ethernet, follow steps 8a and 8b. If coaxial, follow steps 9a and 9b. Then, continue to step 10.

   **a)** If connecting via Ethernet, get the white Ethernet cable from the box and plug one end in the white port on the back of the Router.

   **b)** Plug the other end of the white Ethernet cable into the high-speed Ethernet jack.

9. **a)** If connecting via coaxial cable, get a coaxial cable and connect one end to the red Coax port on the back of the Router.

   **b)** Connect the other end of the coaxial cable to a coax jack.

10. Make sure the Ethernet WAN light (if connecting via Ethernet) or Coax WAN light (if connecting via coaxial cable) on the front of the Router glows steadily green. If connecting via coaxial cable, this may take a few minutes.

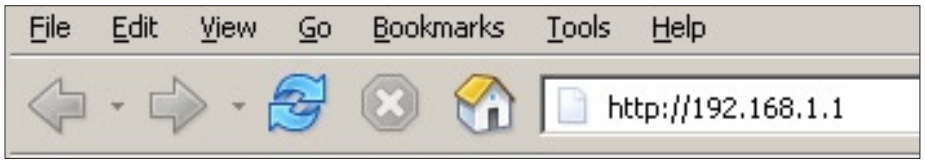
☞ ***Note***: If the Ethernet WAN light or Coax WAN light does not illuminate, make sure the cable (Ethernet or coaxial) is connected properly at both ends.

## Configuring the Router

1. Open a web browser on the computer connected to the Router. In the "Address" text box, type:

   `http://192.168.1.1`

   then press **Enter** on the keyboard.



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**2.** The "Login" screen appears. Enter the default user name (admin) and password (password) in the appropriate text boxes, then click **OK**.

**3.** The "Login Setup" screen appears. Select a new user name and password and enter them in the appropriate text boxes (the password must be entered twice, for validation purposes). Write the new user name and password down on a piece of paper and keep it in a safe place, since they will be needed to access the Router's MegaControl Panel™ in the future.

Login Setup
Step 1.
We now require you to change your default login User Name and Password. Please select a new login User Name and Password and type it into the appropriate fields below.
NOTE: The password must be at least 6 characters long and include at least one alpha numeric character. The password cannot begin with characters such as "?!@#$%^&*".
New User Name:
admin
New Password:
Retype New Password:
Step 2.
Please select your apropriate Time Zone and click OK.
Local Time:
Aug 4, 2006 19:25:52
Time Zone:
Eastern_Time (GMT-05:00)
OK

**4.** In the bottom part of the screen, select the correct time zone from the "Time Zone" drop-down list, then click **OK** at the bottom of the screen.

The Router is now configured.



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## Connecting Other Computers/Set Top Boxes

The Router can connect to other computers or set top boxes in three ways: via Ethernet, via wireless connection, or via coaxial cable.

### *Ethernet*

1. Get an Ethernet cable and plug one end into one of the open yellow Ethernet ports on the back of the Router.
2. Plug the other end of the Ethernet cable into an Ethernet port on the computer.
3. Make sure the corresponding Ethernet LAN light on the front of the Router glows steadily green.
4. Repeat these steps for each computer to be connected to the Router via Ethernet.

### *Wireless*

1. Make sure each computer to be connected wirelessly has built-in wireless or an attached wireless adapter.
2. Make sure the computer uses the same ESSID and WEP key as the Router by launching the computer's wireless application
3. Enter the ESSID and WEP key found on the sticker on the bottom of the Router in the computer's wireless settings and click **Save**. Make sure to configure the computer to use 64/40-bit WEP encryption.
4. Make sure the changes were implemented by surfing the Internet from the computer.
5. Repeat these steps for every other computer to be connected to the Router wirelessly.



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### *Coaxial*

1. Make sure all set top boxes are turned off.
2. Disconnect any adapter currently connected to the coaxial jack in the room where the Router is.
3. Connect one end of the coaxial cable to the coaxial wall jack, and the other end to the red Coax port on the back of the Router.
4. Power up the set top box.
5. Make sure the Coax LAN light on the front of the Router glows steadily green. This may take a few minutes. When it does, the set top box is connected to the Router.

## Computer Network Configuration

Each network interface on the computer should either be configured with a statically defined IP address and DNS address, or instructed to automatically obtain an IP address using the Network DHCP server. The Router is set up, by default, with an active DHCP server, and Actiontec recommends leaving this setting as is.

### Configuring Dynamic IP Addressing

To set up a computer to use dynamic IP addressing:

### *Windows XP*

1. Select **Network Connections** in the Control Panel.
2. Right-click **Ethernet Local Area Connection**, then click **Properties**.
3. In the "General" tab, select **Internet Protocol (TCP/IP)**, then click **Properties**.
4. The "Internet Protocol (TCP/IP) Properties" window appears.
5. Click the "Obtain an IP address automatically" radio button.
6. Click the "Obtain DNS server address automatically" radio button.
7. Click **OK** in the "(TCP/IP) Properties" screen, then click **OK** in the "Local Area Connection Properties" screen to save the settings.



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### *Windows 2000*

1. Select **Network and Dialing Connections** in the Control Panel.
2. Right-click on the Ethernet connection's icon, then click **Properties**.
3. Select **Internet Protocol (TCP/IP)** component, then click **Properties**.
4. The "Internet Protocol (TCP/IP) Properties" window appears.
5. Click the "Obtain an IP address automatically" radio button.
6. Click the "Obtain DNS server address automatically" radio button.

### *Windows 98/Me*

1. Select **Network** in the Control Panel.
2. Select the TCP/IP settings for the network card, then click **Properties**.
3. Click the "Obtain an IP address automatically" radio button in the "IP Address" tab.
4. Click **Disable DNS** in the DNS configuration tab.
5. Click **OK** in the "TCP/IP Properties" screen.
6. Click **OK** in the "Network" screen to reboot and save the settings.

### *Windows NT*

1. Click **Network** in the Control Panel. The "Network" window appears.
2. In the "Protocol" tab, select **Internet Protocol (TCP/IP)** then click **Properties**.
3. In the "IP Address" tab, click the "Obtain an IP address automatically" radio button.
4. In the "DNS" tab, verify no DNS server is defined in the "DNS Service Search Order" text box and no suffix is defined in the "Domain Suffix Search Order" text box.



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### *Linux*

1. Login into the system as a super-user, by entering "su" at the prompt.
2. Type "ifconfig" to display the network devices and allocated IPs.
3. Type "pump -i <dev>," where <dev> is the network device name.
4. Type "ifconfig" again to view the newly allocated IP address.
5. Make sure no firewall is active on device <dev>.

## Home Page

After logging into the Router's MegaControl Panel (see "Configuring the Router" at the beginning of this chapter), the "Home" screen appears.

The Home screen has a "Main Menu" that occupies the top of the screen. Below that, the screen is divided into three columns: "My Router," "My Network," and "Action Zone."



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## Main Menu

The "Main Menu" contains links to all of the configuration options of the Router: **Wireless Setup** (explained in chapter 4 of this manual), My **Network** (chapter 5), **Firewall** (chapter 6), **Parental Controls** (chapter 7), **Advanced** (chapter 8), and **System Monitoring** (chapter 9).

## My Router

This section displays the status of the Router's network and Internet connection. A green light signifies the Router is connected; a yellow light means the Router is attempting to connect; and a red light signifies the Router's connection is down.

### *Broadband Connection*

The "Broadband Connection" section of My Router displays the state of the Router's broadband connection ("Connected" or "Disconnected") for the two connection options ("Coax Status" and "Ethernet Status"), and the WAN IP address of the broadband connection.

### *Quick Links*

The "Quick Links" section of My Router contains a list of frequently accessed settings, including "Change Wireless Settings," "Change Login User Name & Password," "Enable Gaming," and "Logout."

## My Network

The "My Network" section of the Home screen displays the connection type, name, and IP address of all devices connected to the Router's network. The icon associated with the device will be displayed normally (signifying an active device) or shaded (signifying the device has not been active for at least 60 seconds). The user can also configure the basic settings of each device by clicking on its icon. These settings are described in more detail in chapter 3, "Configuring My Network Settings."

## Action Zone

This section contains links to various Verizon Web sites, and other informational links. Clicking on the icon above "Go to Internet Now" connects the user to the home page configured on the user's web browser.



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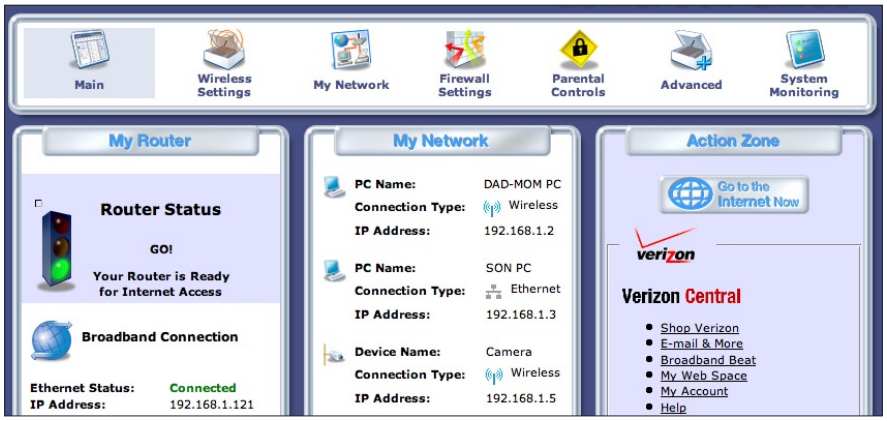
# Configuring My Network Settings

# 3

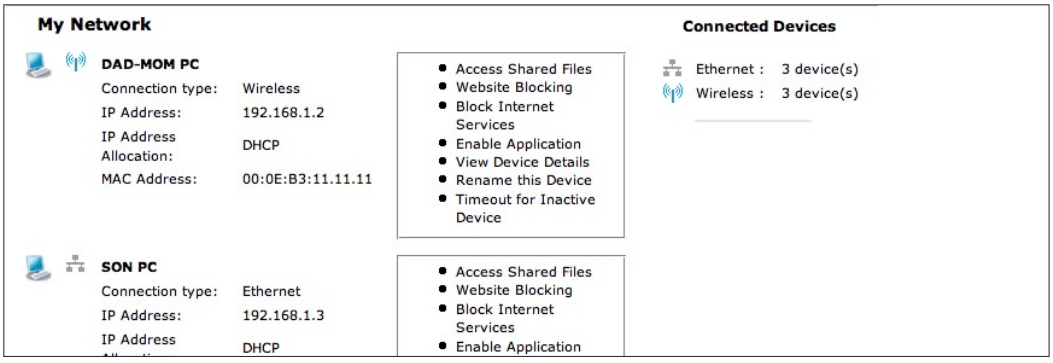
Once the Wireless Broadband Router is physically connected and the MegaControl Panel's Home screen is displayed in a web browser, a list of the devices connected to the Router's network appears in the "My Network" section of the screen. From here, some basic network settings can be configured.

## Accessing My Network

To access My Network, click on the "My Network" icon in the Home screen.




The "My Network" screen appears:




On the far right side of the screen, in the "Connected Devices" section, is list of the devices currently connected to the network, listed by connection type and number. The rest of the screen contains the "My Network" section, which displays each device connected to the network, and a series of configuration settings.



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## Using My Network

Various settings can be accessed for a particular device, as follows.

### Access Device

For devices that can be accessed (such as Internet cameras and networked hard drives), locate it in the My Network column, then click **Access Devices** to use the device over the network.

### Access Shared Files

To access the shared files on a particular device, locate the device in the My Network column, then click **Access Shared Files**. A list of shared files appears on the screen.

### Website Blocking

Website blocking is used to prevent a device on the network from accessing particular websites on the Internet. To set up website blocking on a networked device, locate the device in the My Network column, then click **Website Blocking**. The "Website Blocking" screen appears.

Website Blocking
Block access to specific websites for specific computers or devices that are connected to the network.
Note: To activate the Website Blocking Feature, please ensure to check the box next to Enable Website Blocking
Enable Website Blocking
Networked Computer / Device
Network Address
Blocked Website
Status
Action
Add
Press the Refresh button to update the data.
Apply
Cancel
Resolve Now
Refresh

1. Click in the "Enable Website Blocking" check box to enable web site blocking, then click **Add**.



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2. The "Blocked Website" screen appears. Enter the website address (IP or URL) to block on the network (all pages within the website will also be blocked). If the website address has multiple IP addresses, the Router will resolve all additional addresses and automatically add them to the restrictions table.

3. To apply website blocking to a computer on the network, select it from the "Networked Computer/Device" drop-down list.

4. If website blocking needs to be active all the time, select "Always" from the "When should this rule occur?" drop-down list. If the rule will only be active at certain times select "Specify Schedule" and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the "Advanced Settings" chapter of this manual).

☞ ***Note:*** Make sure the Router's date and time settings for current time zone are set correctly for schedule rules to function properly.

5. Click **Apply** to add the website to the table. The previous screen appears while the Router attempts to find the site. "Resolving..." appears in the "Status" column while the site is being located.

6. If the site is successfully located, "Resolved" appears in the Status column. If not, "Hostname Resolution Failed" appears. Click **Refresh** to update the status if necessary. If the Router fails to locate the website, do the following:

   - Use a web browser to verify the website is available. If it is, the website address was entered incorrectly.

   - If the website is not available, return to the Website Blocking screen at a later time and click **Resolve Now** to verify the website can be found and blocked by the Router.



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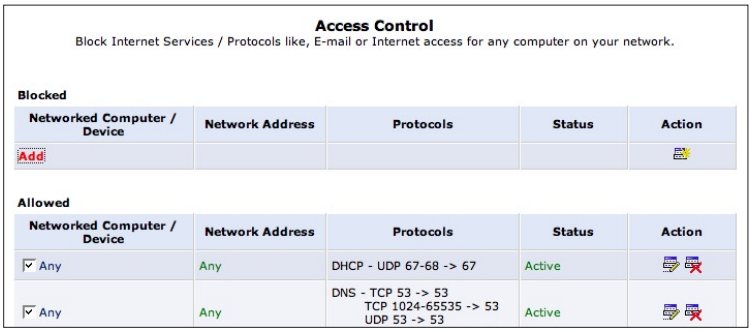
## Block Internet Services

Internet services blocking is used to prevent a device on the network from accessing particular services on the Internet, such as receiving E-mail or downloading from FTP sites. To set up Internet services blocking on a networked device, locate the device in the My Network column, then click **Block Internet Services**. The "Access Control" screen appears.




1. Click **Add** in the "Networked computer/Device" column. The "Add Access Control Rule" screen appears.

2. If this access control rule applies to all networked devices, select "Any" from the "Networked Computer/Device" list box. If this rule applies to certain devices only, select "Specify Address" and click **Add**. Then, add a network object (for more details about adding network objects, see the "Advanced Settings" chapter of this manual).

3. Select the Internet protocol to be blocked from the "Protocol" drop-down list.



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4. If this rule will be active all the time, select "Always" from the "When should this rule occur?" drop-down list. If the rule will only be active at certain times select "Specify Schedule" and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the "Advanced Settings" chapter of this manual).

   ☞ ***Note:*** Make sure the Router's date and time settings for your time zone are set correctly for schedule rules to function properly.

5. Click **Apply** to save the changes. The Access Control screen will display a summary of the access control rule.

   ☞ ***Note:*** To block a service that is not included in the list select "Specify Protocol" from the Protocol drop-down menu. The "Edit Service" screen appears. Define the service, then click **Apply**. The service will then be automatically added to the top section of the "Add Access Control Rule" screen, and will be selectable.

The user may disable an access control and the service made available without having to remove the service from the Access Control table. This may be useful to make the service available only temporarily, with the expectation that the restriction will be reinstated later.

- To temporarily disable an access control clear the check box next to the network computer/device.
- To reinstate the restriction at a later time select the check box next to the network computer/device.
- To remove an access restriction from the Access Control table click the Remove button for the service. The service will be removed from the Access Control table.

☞ ***Note:*** When Web Filtering is enabled, HTTP services cannot be blocked by access control.



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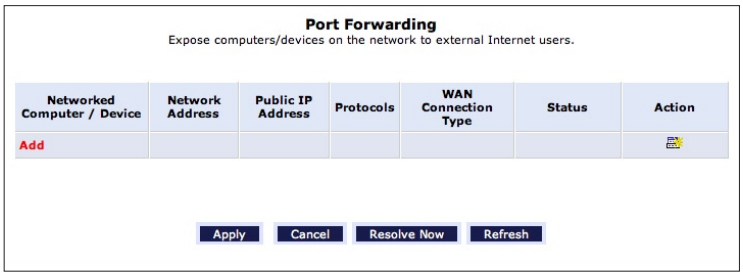
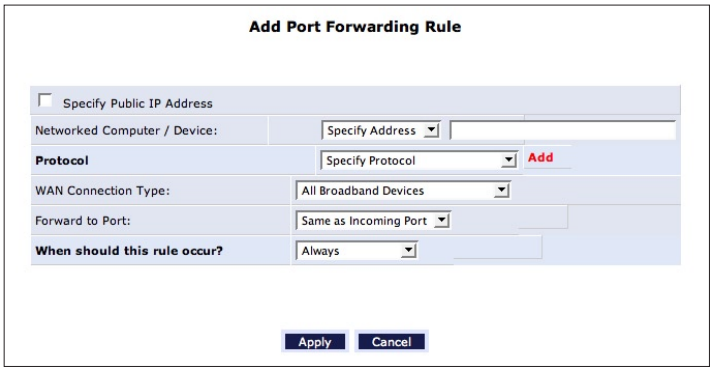
## Enable Application

Activating "Enable Application" (also known as port forwarding) allows the network to be exposed to the Internet in certain limited and controlled ways, enabling some applications to work from the local network (game, voice, and chat applications, for example), as well as allowing Internet access to servers in the network. To set this up on a networked device, locate the device in the My Network column, then click **Enable Applications**. The "Port Forwarding" screen appears.




1. Click **Add**. The "Add Port Forwarding Rule" screen appears.




2. Enter the local IP address or the host name of the computer providing the service in the "Networked Computer/Device" text box. Note that only one local network computer can be assigned to provide a specific service or application.

3. Select the Internet protocol to be provided from the "Protocol" drop-down list.

4. To select a port to forward communications to (this is optional), select "Specify" from the "Forward to Port" drop-down list, then, in the text box that appears, enter the port number. If no port is identified, select "Same as Incoming Port."

5. If this port will be active all the time, select "Always" from the "When should this rule occur?" drop-down list. If the rule will only be active at certain times select "Specify Schedule" and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the "Advanced Settings" chapter of this manual).



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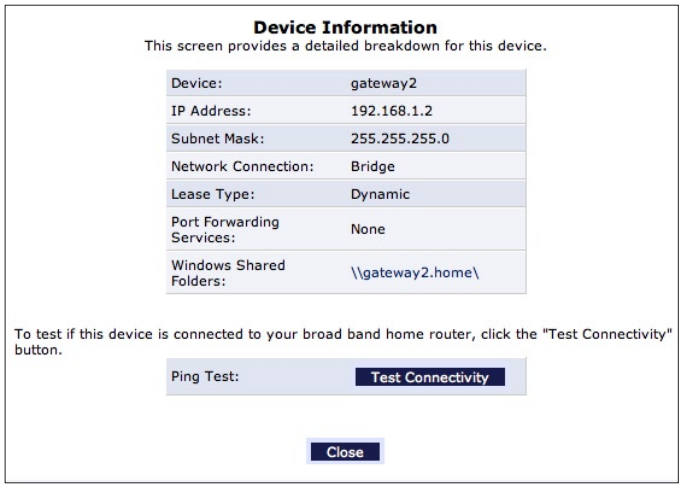
**6.** Click **Apply** to save the changes.

☞ ***Note:*** Some applications, such as FTP, TFTP, PPTP, and H323, require the support of special specific Application Level Gateway (ALG) modules to work inside the local network. Data packets associated with these applications contain information that allows them to be routed correctly. An ALG is needed to handle these packets and ensure they reach their intended destinations. The Router is equipped with a robust list of ALG modules, enabling maximum functionality in the local network.

The ALG is automatically assigned based on the destination port.

## View Device Details

To view information about a networked device, or to test a device's connection, locate the device in the My Network column, then click **View Device Details**. The "Device Information" screen appears.


Device Information
This screen provides a detailed breakdown for this device.
Device: gateway2
IP Address: 192.168.1.2
Subnet Mask: 255.255.255.0
Network Connection: Bridge
Lease Type: Dynamic
Port Forwarding Services: None
Windows Shared Folders: \\gateway2.home\
To test if this device is connected to your broad band home router, click the "Test Connectivity" button.
Ping Test: Test Connectivity
Close



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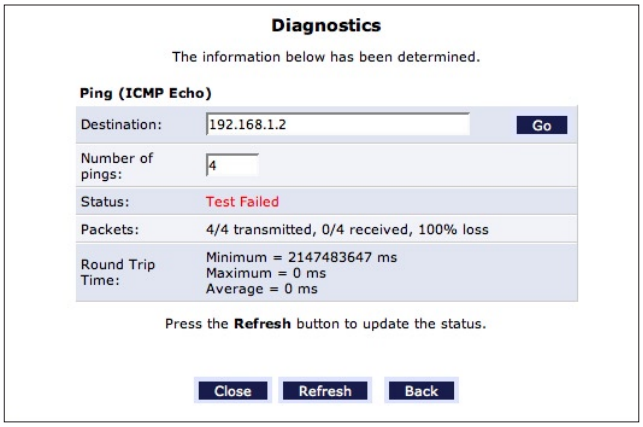
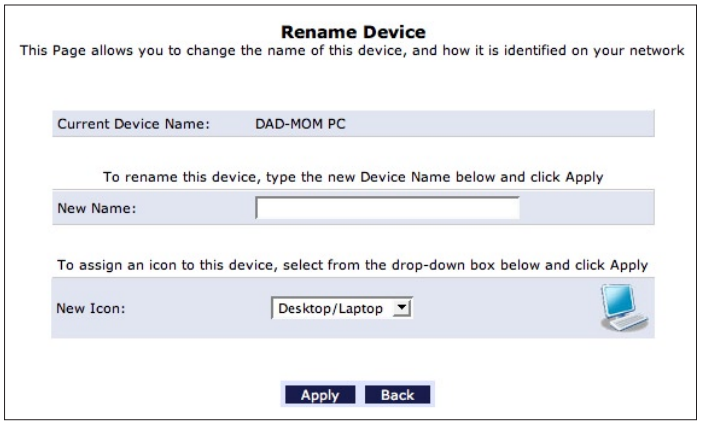
1. Click **Test Connectivity**. The "Diagnostics" screen appears.




2. Click **Go**. The Router runs a ping test, and the results are displayed in the Diagnostics screen.

## Rename This Device

To rename a networked device, locate the device in the My Network column, then click **Rename This Device**. The "Rename Device" screen appears.


Rename Device
This Page allows you to change the name of this device, and how it is identified on your network
Current Device Name:
DAD-MOM PC
To rename this device, type the new Device Name below and click Apply
New Name:
To assign an icon to this device, select from the drop-down box below and click Apply
New Icon:
Desktop/Laptop
Apply
Back

Enter the new name of the device in the "New Name" text box and, if needed, select a new icon for the device from the "New Icon" drop-down list.



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## Timeout for Inactive Device

The amount of time a device continues to be displayed on the network after it has been disconnected is configured in the "Timeout for Inactive Device" screen. To display the screen, click **Timeout for Inactive Device**.

Timeout for Inactive Device
After a device is removed from the router, the setting below is the time frame that it will take for the device to no longer be displayed on the network. This page allows you to change the time out setting.
Please select the desired time frame then click the Apply button for the settings to take affect.
Timeout:
5 min
Apply
Back

Select the timeout period from the "Timeout" drop-down list. After the device has been disconnected for this amount of time, it will no longer be displayed in the "My Network" column.



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# Creating a Wireless Network

# 4

This chapter explains how to create a wireless network using the Wireless Broadband Router, including accessing and configuring wireless security options.

## Overview

The Wireless Broadband Router provides the user with wireless connectivity over the 802.11b and g standards (the most common wireless standards). 802.11b has a maximum data rate of 11 Mbps, while 802.11g has a maximum data rate of 54 Mbps. Both operate in the 2.4 GHz range.

The Router's wireless feature is turned on, with wireless security activated, by default. The level of security is 64/40-bit WEP, with a unique WEP key already entered. This information is displayed on a sticker located on the bottom of the Router.

The Router integrates multiple layers of security. These include the IEEE 802.1x port-based authentication protocol, RADIUS client, EAP-MD5, EAP-TLS, EAP-TTLS, EAP-PEAP, Wired Equivalent Privacy (WEP), Wi-Fi Protected Access (WPA) and firewall and VPN applications.

### Connecting a Wireless Client

To connect a wireless client to the Router:

☞ ***Note***: The following procedure assumes the Router's default wireless settings are intact. If they have been changed, use the new ESSID and wireless security settings. For more details, see the "Connecting a Wireless Windows XP Client" section of this chapter.

1. In the wireless client's configuration interface, enter the Router's ESSID (found on a sticker on the bottom of the Router's case) in the appropriate text box or field (this varies depending on the wireless client's manufacturer).

2. Enter the Router's WEP key (also found on the sticker on the bottom of the Router's case) in the wireless client's configuration interface.

3. Save the changes and exit the wireless client's configuration interface. The client should now detect and join the Router's wireless network. If not, check the wireless client's documentation, or contact its manufacturer.



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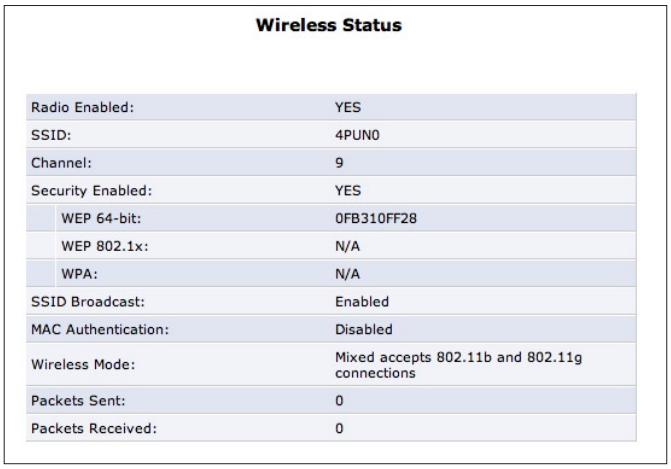
## Wireless Status

Clicking on the "Wireless Settings" icon in the Home screen generates the "Wireless Status" screen, which displays the current status of the wireless connection.




### Radio Enabled

Displays whether the Router's wireless radio is active.

### SSID

The SSID (Service Set Identifier) is the network name shared among all devices on a particular wireless network. The SSID must be identical for all devices on the wireless network. It is case-sensitive and must not exceed 32 characters. Make sure the SSID is the same for all devices to be connected to the wireless network. The Router comes from the factory with an SSID already entered and displayed here. The default SSID can also be found on a sticker on the bottom of the Router.

### Channel

Displays the channel to which the wireless connection is currently set. All devices on the wireless network must be on the same channel to function correctly.

### Security Enabled

Displays what kind of security is active on the wireless connection, and the security encryption key.



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### SSID Broadcast

Displays whether the Router is broadcasting its SSID. If activated, the SSID of the Router's wireless network is broadcast wirelessly.

### MAC Authentication

Displays whether the Router is using MAC (Media Access Control) address authentication to allow wireless devices to join the network.

### Wireless Mode

Displays the types of wireless device that can join the network. Options include **802.11b**, **802.11g**, or **Mixed** (allows both 802.11b- and 802.11g-equipped wireless devices to join the network).

### Packets Sent/Received

Displays the number of packets sent and received since the Router's wireless capability was activated.



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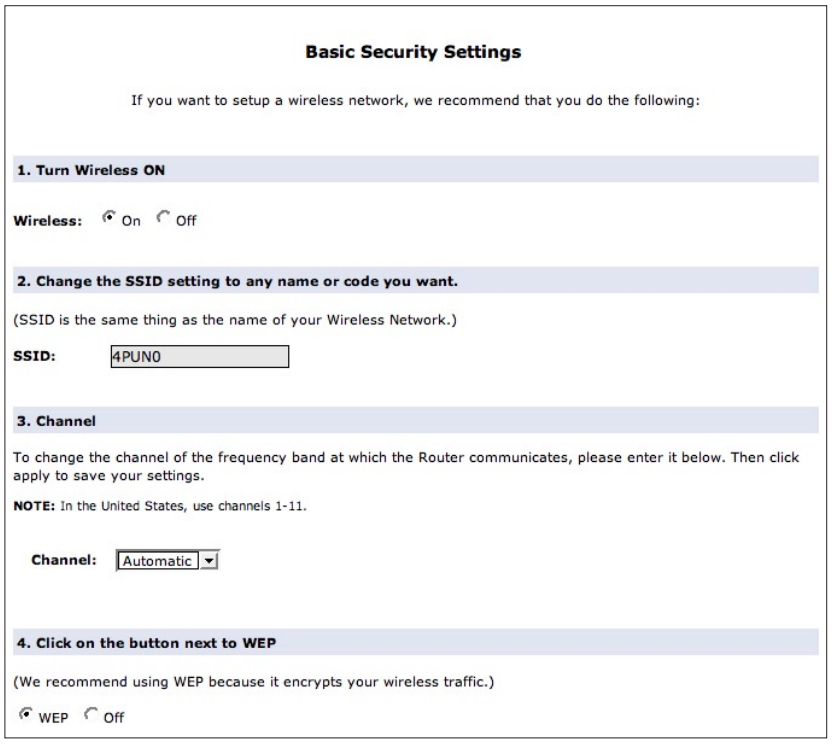
## Basic Security Settings

To configure the Router's wireless network for basic security, select "Basic Security Settings" from the menu on the left side of any Wireless Settings screen. The "Basic Security Settings" screen appears.


Basic Security Settings
If you want to setup a wireless network, we recommend that you do the following:
1. Turn Wireless ON
Wireless: On Off
2. Change the SSID setting to any name or code you want.
(SSID is the same thing as the name of your Wireless Network.)
SSID: 4PUN0
3. Channel
To change the channel of the frequency band at which the Router communicates, please enter it below. Then click apply to save your settings.
NOTE: In the United States, use channels 1-11.
Channel: Automatic
4. Click on the button next to WEP
(We recommend using WEP because it encrypts your wireless traffic.)
WEP Off

1. Click the "On" radio button to activate the Router's wireless radio.
2. Enter the name of the wireless network in the "SSID" text box.
3. Select the channel at which the Router's wireless radio communicates by selecting it from the "Channel" drop-down list.
4. Click the "WEP" radio button to activate WEP (Wired Equivalent Privacy) security on the wireless network.



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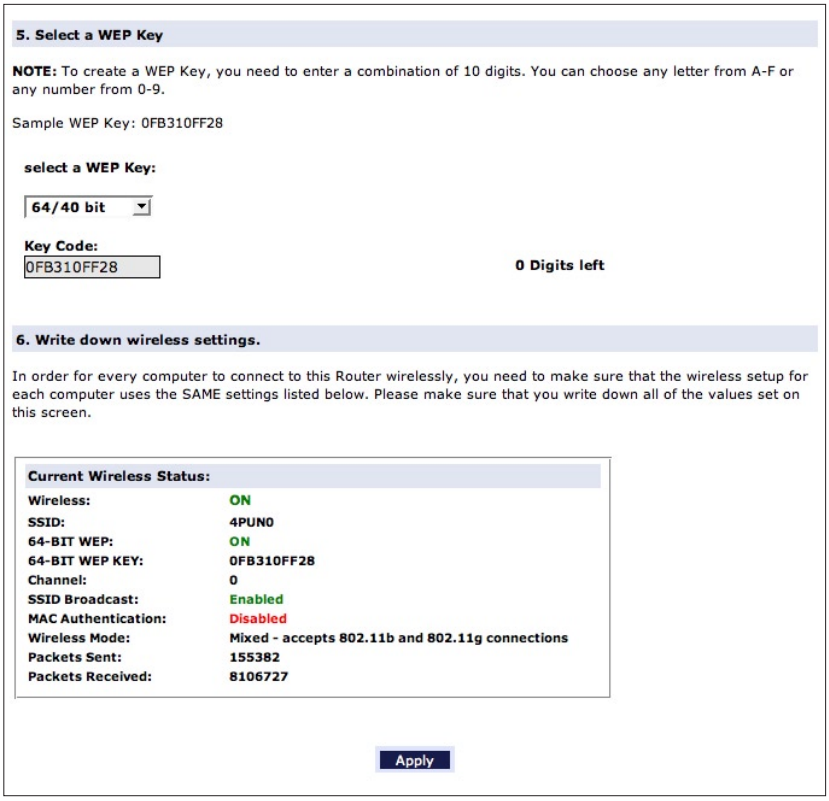
5. Select a WEP Key
NOTE: To create a WEP Key, you need to enter a combination of 10 digits. You can choose any letter from A-F or any number from 0-9.
Sample WEP Key: 0FB310FF28
select a WEP Key:
64/40 bit
Key Code:
0FB310FF28
0 Digits left
6. Write down wireless settings.
In order for every computer to connect to this Router wirelessly, you need to make sure that the wireless setup for each computer uses the SAME settings listed below. Please make sure that you write down all of the values set on this screen.
Current Wireless Status:
Wireless: ON
SSID: 4PUN0
64-BIT WEP: ON
64-BIT WEP KEY: 0FB310FF28
Channel: 0
SSID Broadcast: Enabled
MAC Authentication: Disabled
Wireless Mode: Mixed - accepts 802.11b and 802.11g connections
Packets Sent: 155382
Packets Received: 8106727
Apply

5. Select a WEP security level from the "select a WEP Key" drop-down list (options include "64/40 bit" or "128/104 bit").

6. Enter the key code in the "Key Code" text box. Each character must be a letter from A-F or a number from 0-9. If 64/40 bit was selected in step 5, enter 10 characters. If 128/104 was selected, enter 26 characters.

7. Write down the wireless settings displayed on the screen. Other wireless devices wishing to join the Router's wireless network must use these same settings when configuring the device's wireless networking scheme.

8. Click **Apply** to save the settings.



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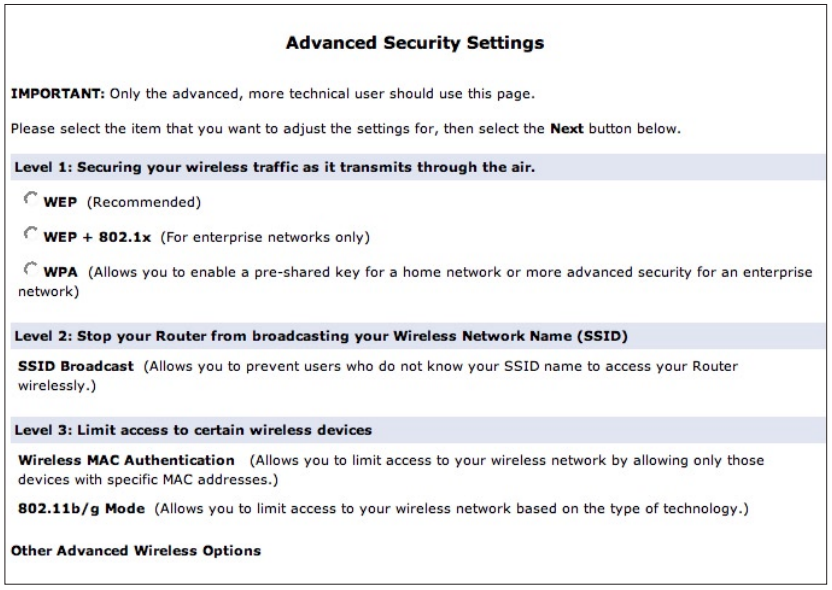
## Advanced Security Settings

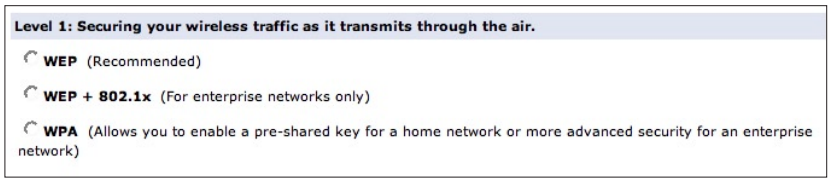
To configure the Router's advanced wireless network security settings, select "Advanced Security Settings" from the menu on the left side of any Wireless Settings screen. The "Advanced Security Settings" screen appears.

☞ ***Note***: The advanced settings should only be configured by experienced technical users.


Advanced Security Settings
IMPORTANT: Only the advanced, more technical user should use this page.
Please select the item that you want to adjust the settings for, then select the Next button below.
Level 1: Securing your wireless traffic as it transmits through the air.
WEP (Recommended)
WEP + 802.1x (For enterprise networks only)
WPA (Allows you to enable a pre-shared key for a home network or more advanced security for an enterprise network)
Level 2: Stop your Router from broadcasting your Wireless Network Name (SSID)
SSID Broadcast (Allows you to prevent users who do not know your SSID name to access your Router wirelessly.)
Level 3: Limit access to certain wireless devices
Wireless MAC Authentication (Allows you to limit access to your wireless network by allowing only those devices with specific MAC addresses.)
802.11b/g Mode (Allows you to limit access to your wireless network based on the type of technology.)
Other Advanced Wireless Options

### Level 1 (Wireless Security)

This section is used to configure different types of wireless security. Select the type of wireless security to apply to the wireless network by clicking the appropriate radio button, then configure the security settings in the subsequent screens.


Level 1: Securing your wireless traffic as it transmits through the air.
WEP (Recommended)
WEP + 802.1x (For enterprise networks only)
WPA (Allows you to enable a pre-shared key for a home network or more advanced security for an enterprise network)



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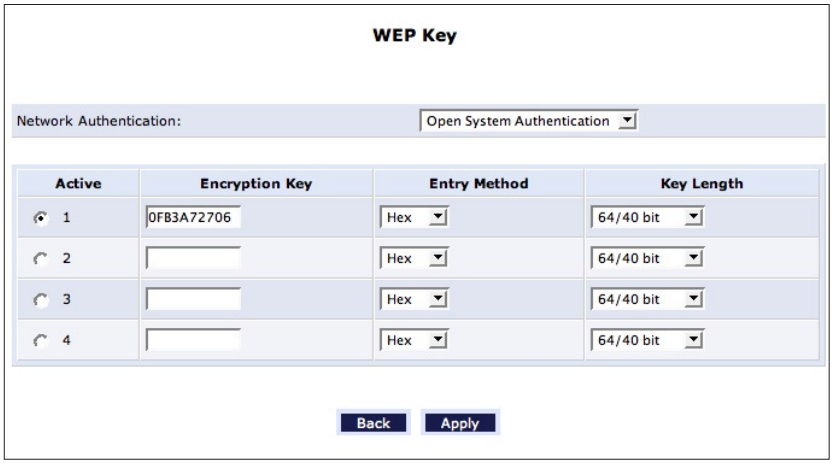
### *WEP*

If WEP was selected in the Advanced Security Settings screen, the "WEP Key" screen appears.




1. Select the appropriate network authentication level from the drop-down list. Options include **Open System Authentication**, **Shared Key Authentication**, or **Both**.

2. Activate WEP key 1 by clicking the radio button next to "1" on the left side.

3. Select the length of key 1 by selecting "64/40 bit" or "128/104 bit" from the appropriate drop-down list in the "Key Length" column.

4. Select the type of key from the appropriate drop-down list in the "Entry Method" column. If "Hex" is selected, the key must be made up of hexadecimal digits. If "ASCII" is selected, the key can be made up of any characters.

5. Enter the key in the appropriate text box in the "Encryption Key" column. If 64/40 bit was chosen in step 2, enter 10 characters. If 128/104 bit was chosen, enter 24 characters. Depending on what option was selected in step 3, enter hexadecimal or ASCII characters.

6. Click **Apply** to save changes.



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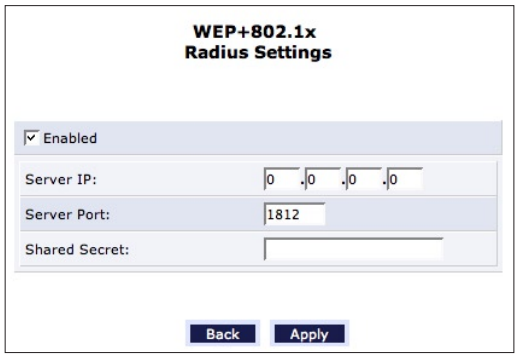
### *802.1X WEP*

If 802.1X WEP (Wired Equivalent Privacy) was selected, the "WEP+802.1x Radius Settings" screen appears.
802.1x WEP is a robust security protocol that uses port control with dynamically changing encryption keys automatically updated over the network. 802.11x WEP uses a RADIUS (Remote Authentication Dial-in Service) server for authentication purposes. This server must be physically connected to the Router. Also, the user must enable the RADIUS client embedded in the Router (to do this, see chapter 9, "Advanced Settings").




1. Click in the "Enabled" check box to enable WEP+802.1x security.
2. Enter the RADIUS server IP address in the "Server IP" text boxes.
3. Enter the RADIUS server's port number in the "Server Port" text box.
4. Enter the RADIUS server's shared secret in the "Shared Secret" text box.
5. Click **Apply** to save changes.



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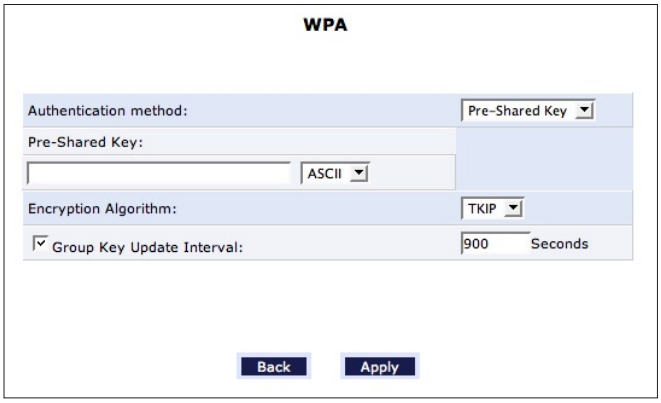
### *WPA*

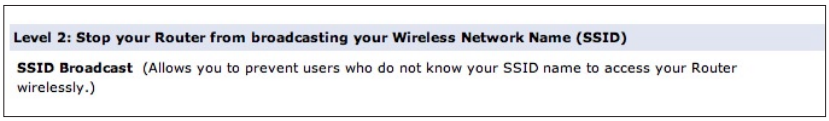
If WPA (Wi-Fi Protected Access) was selected, the "WPA Key" screen appears.




1. Verify the authentication method selected is "Pre-Shared Key."
2. Enter a phrase of at least eight characters in the "Pre-Shared Key" text box. Verify that "ASCII" is selected in the associated drop-down list.
3. Select the proper encryption algorithm (**TKIP** or **AES**).
4. Click in the "Group Key Update Interval" check box to activate the group key update interval, and set the interval time in the text box to the right.
5. Click **Apply** at the bottom of the screen to save changes.

## Level 2 (SSID Broadcast)

This section is used to configure the Router's SSID broadcast capabilities.


Level 2: Stop your Router from broadcasting your Wireless Network Name (SSID)
SSID Broadcast (Allows you to prevent users who do not know your SSID name to access your Router wirelessly.)



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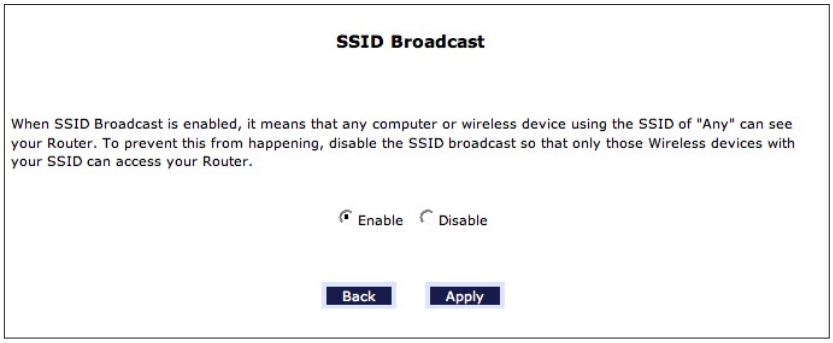
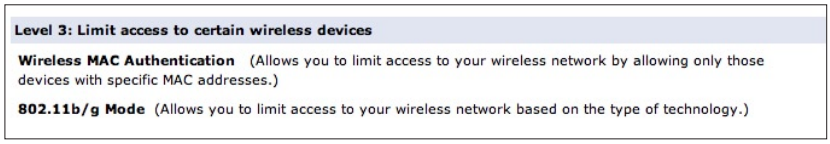
Selecting "SSID Broadcast" generates the "SSID Broadcast" screen.


SSID Broadcast
When SSID Broadcast is enabled, it means that any computer or wireless device using the SSID of "Any" can see your Router. To prevent this from happening, disable the SSID broadcast so that only those Wireless devices with your SSID can access your Router.
Enable
Disable
Back
Apply

Click the "Enable" radio button to enable SSID broadcasting. If enabled, the SSID of the Router's wireless network will be broadcast wirelessly. To disable SSID broadcasting, click the "Disable" radio button.

## Level 3 (Limiting Access)

This section is used to limit access to the Router's wireless network.


Level 3: Limit access to certain wireless devices
Wireless MAC Authentication (Allows you to limit access to your wireless network by allowing only those devices with specific MAC addresses.)
802.11b/g Mode (Allows you to limit access to your wireless network based on the type of technology.)



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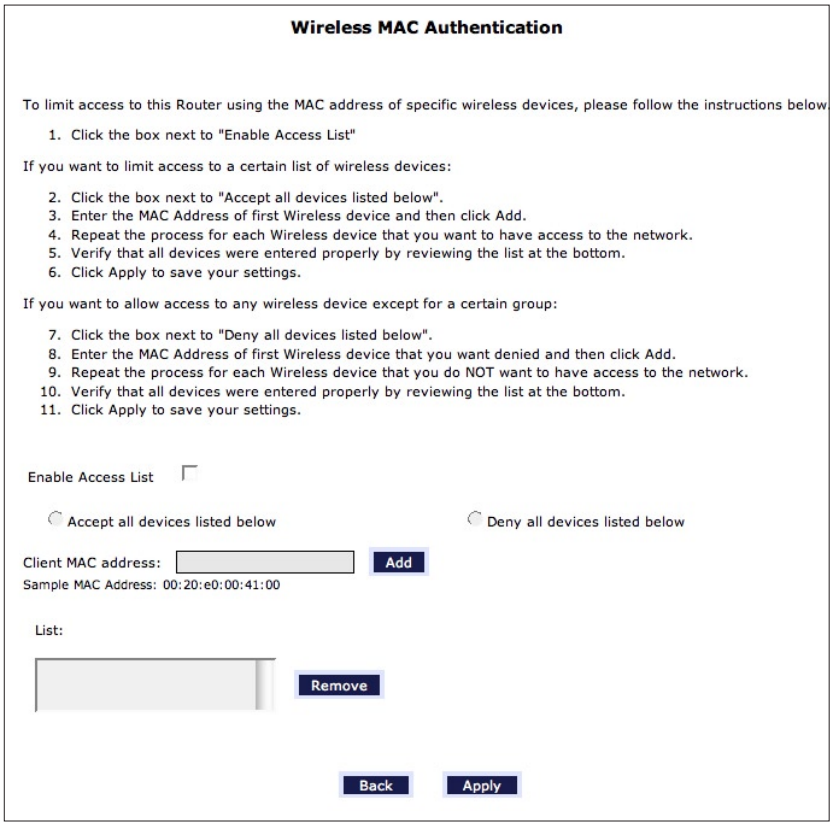
### *Wireless MAC Authentication*

Wireless MAC authentication allows the user to allow or deny access to the Router's wireless network by a particular device's MAC address. Selecting "Wireless MAC Authentication" from the Advanced Security Settings screen generates the "Wireless MAC Authentication" screen.


Wireless MAC Authentication
To limit access to this Router using the MAC address of specific wireless devices, please follow the instructions below.
1. Click the box next to "Enable Access List"
If you want to limit access to a certain list of wireless devices:
2. Click the box next to "Accept all devices listed below".
3. Enter the MAC Address of first Wireless device and then click Add.
4. Repeat the process for each Wireless device that you want to have access to the network.
5. Verify that all devices were entered properly by reviewing the list at the bottom.
6. Click Apply to save your settings.
If you want to allow access to any wireless device except for a certain group:
7. Click the box next to "Deny all devices listed below".
8. Enter the MAC Address of first Wireless device that you want denied and then click Add.
9. Repeat the process for each Wireless device that you do NOT want to have access to the network.
10. Verify that all devices were entered properly by reviewing the list at the bottom.
11. Click Apply to save your settings.
Enable Access List
Accept all devices listed below
Deny all devices listed below
Client MAC address:
Add
Sample MAC Address: 00:20:e0:00:41:00
List:
Remove
Back
Apply

To set up wireless MAC authentication:

1. Click in the "Enable Access List" check box.
2. Select either "Accept all devices listed below" or "Deny all devices listed below" by clicking the appropriate radio button. Selecting "Accept…" causes all devices listed by MAC address to access the Router's wireless network. Selecting "Deny…" causes all listed devices to be denied access.
3. Enter the MAC address of a device in the "Client MAC address" text box.
4. Click **Add**.
5. Repeat steps 3 and 4 to add more devices to the list.
6. When finished listing devices, click **Apply**.

To remove a MAC address, select it from the "List" list box, then click **Remove**.



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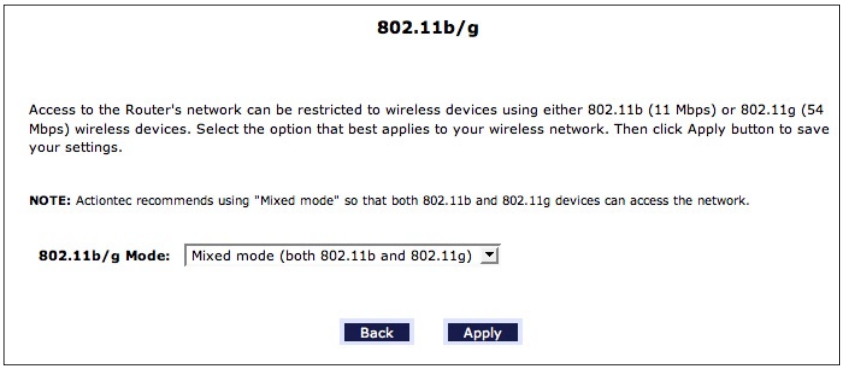
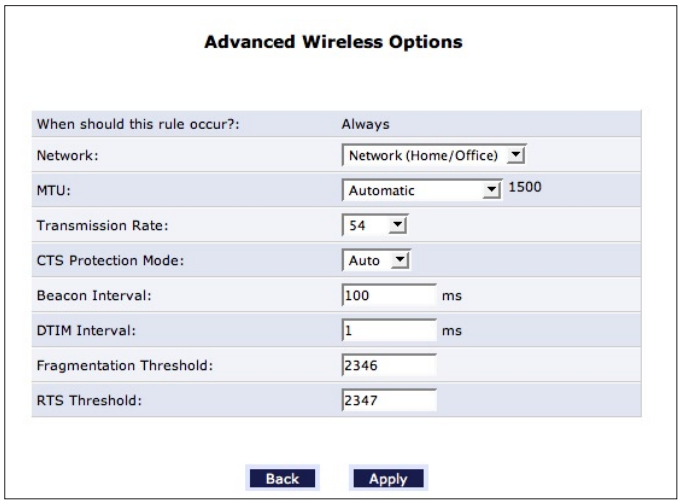
### *802.11b/g Mode*

This option allows the user to select the wireless communication standard compatible with the devices to be connected on the wireless network from the drop-down list. Options include **802.11b**, **802.11g**, or **Mixed** (allows both 802.11b and 802.11g-equipped wireless devices to join the network).


802.11b/g
Access to the Router's network can be restricted to wireless devices using either 802.11b (11 Mbps) or 802.11g (54 Mbps) wireless devices. Select the option that best applies to your wireless network. Then click Apply button to save your settings.
NOTE: Actiontec recommends using "Mixed mode" so that both 802.11b and 802.11g devices can access the network.
802.11b/g Mode:
Mixed mode (both 802.11b and 802.11g)
Back
Apply

## Advanced Wireless Options

Clicking "Other Advanced Wireless Options" at the bottom of the Advanced Security Settings screen generates the "Advanced Wireless Options" screen.




### *When should this rule occur?*

Displays the time during which the rule is active. To configure schedule rules, see chapter 9, "Advanced Settings."



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### *Network*

Select the type of connection being configured from this drop-down list (options: **Network** [**Home/Office**], **Broadband Connection**, or **DMZ**).

### *MTU*

MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. "Automatic" sets the MTU at 1500. Other choices include "Automatic by DHCP," which sets the MTU according to the DHCP connection, and "Manual," which allows the user to set the MTU.

### *Transmission Rate*

Select the wireless transmission rate from the drop-down list, or select "Auto" to have the Router automatically select the best transmission rate. This setting adjusts the bit rate of the Router's wireless transmissions.

### *CTS Protection Mode*

Activating CTS (Clear to Send) Protection Mode allows mixed 802.11b/g networks to operate at maximum efficiency. Select "Auto" from the drop-down list to activate. Select "None" to deactivate .

### *Beacon Interval*

Beacons are transmitted by the Router to help identify wireless networks. If beacons are transmitted too infrequently, networks may become hard to reach; if too frequently, they become a resource waste. Enter the desired beacon interval value (in milliseconds) in this text box.

### *DTIM Interval*

Enter the DTIM (Delivery Traffic Indication Message) interval value (in milliseconds) in this text box. A DTIM is a countdown mechanism for the Router, informing wireless network clients of the next window for listening to broadcast and multicast messages.



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### *Fragmentation Threshold*

Setting the correct fragmentation threshold can increase the reliability of frame transmissions on the wireless network. Enter the fragmentation threshold in this text box.

### *RTS Threshold*

Enter the RTS (Request to Send) threshold in this text box. This setting controls what size data packet the low level RF protocol issues to an RTS packet.

## Configuring a Wireless Windows XP Client

If the computer has wireless capabilities and is running Windows XP, it will automatically recognize this and create a wireless connection. View this connection under Windows' "Network Connections."

☞ ***Note***: The following description and images are in accordance with Microsoft Windows XP, Version 2002, running Service Pack 2. If running another operating system, see the documentation that came with the wireless adapter being used.

1. Click **Network Connections** in the Control Panel. The "Network Connections" window appears.

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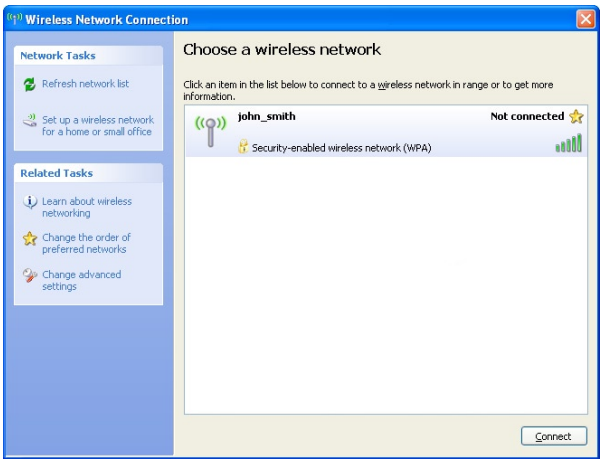
**2.** Double-click the wireless connection icon. The "Wireless Network Connection" screen appears, displaying all available wireless networks in the vicinity. If the Router is connected and active, the Router's wireless connection is displayed. Note that the connection's status is "Not connected" and defined as "Security-enabled wireless network (WPA)" in the figure below.


Wireless Network Connection
Network Tasks
Refresh network list
Set up a wireless network for a home or small office
Related Tasks
Learn about wireless networking
Change the order of preferred networks
Change advanced settings
Choose a wireless network
Click an item in the list below to connect to a wireless network in range or to get more information.
john_smith
Not connected
Security-enabled wireless network (WPA)
Connect

**3.** Click the connection once to mark it, then click **Connect** at the bottom of the screen. After the connection is established, its status will change to "Connected."

An icon appears in the notification area, announcing the successful initiation of the wireless connection.

**4.** Test the connection by disabling all other connections in the Network Connections window and browsing the Internet.

The Router's wireless network can now be accessed from the configured computer. However, any other user with a wireless-equipped device can also access the wireless network. To prevent this, secure the wireless network, as explained in the "Wireless Security" section of this chapter.



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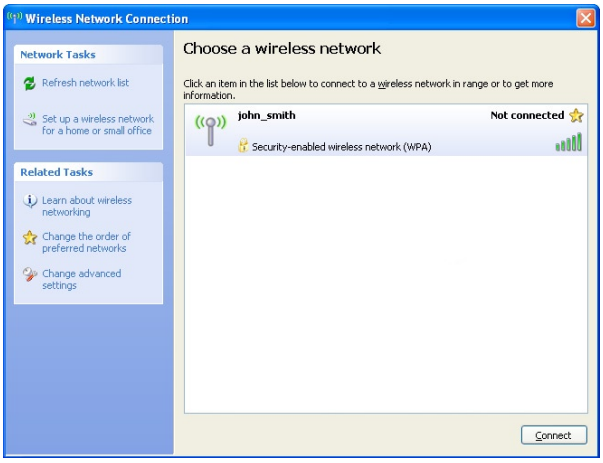
## Connecting a Wireless Windows XP Client

This section assumes the Router is set up with WPA security.

1. Click **Network Connections** in the Control Panel. The "Network Connections" window appears.

2. Double-click the wireless connection icon. The "Wireless Network Connection" screen appears, displaying the Router's wireless connection. Note that the connection is defined as "Security-enabled wireless network (WPA)."


Wireless Network Connection
Network Tasks
Refresh network list
Set up a wireless network for a home or small office
Related Tasks
Learn about wireless networking
Change the order of preferred networks
Change advanced settings
Choose a wireless network
Click an item in the list below to connect to a wireless network in range or to get more information.
john_smith
Not connected
Security-enabled wireless network (WPA)
Connect



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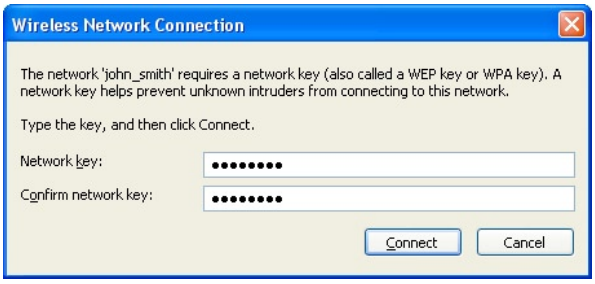
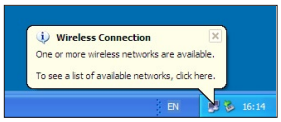
**3.** Click the connection once to mark it, then click **Connect** at the bottom of the screen. The following login window appears, asking for a "Network Key," which is the pre-shared key used when configuring the Router's WPA security (see the "WPA" section in this chapter).


Wireless Network Connection
The network 'john_smith' requires a network key (also called a WEP key or WPA key). A network key helps prevent unknown intruders from connecting to this network.
Type the key, and then click Connect.
Network key:
Confirm network key:
Connect
Cancel

**4.** Enter the pre-shared key in both text boxes and click **Connect**. After the connection is established, its status will change to "Connected," as shown below.

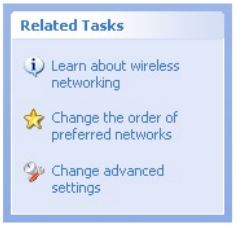
An icon appears in the notification area, announcing the successful initiation of the wireless connection.




**5.** Test the connection by disabling all other connections in the Network Connections window and surfing the Internet.

If the login window shown in step 3 does not appear and the connection attempt fails, configure the connection manually:

**1.** Click the connection once to mark it and then click **Change Advanced Settings** in the "Related Tasks" box on the left part of the window.



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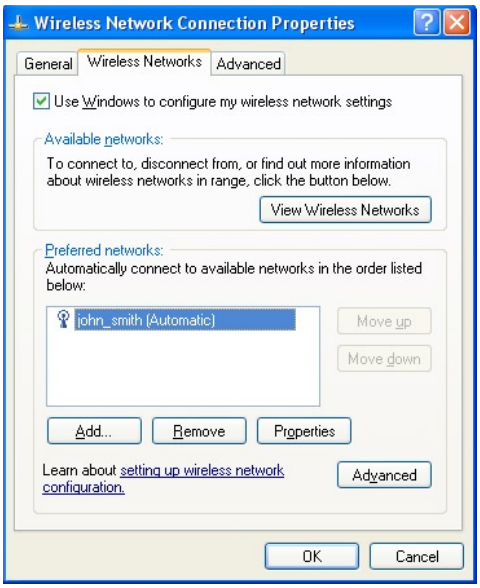
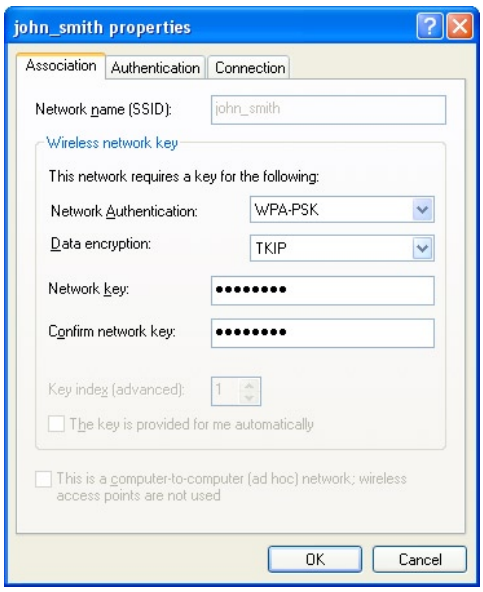
2. The "Wireless Network Connection Properties" window appears. Select **Wireless Networks**.




3. Click the connection to highlight it, then click **Properties**. The connection's "Properties Window" appears.




4. From the "Network Authentication" drop-down list, select **WPA-PSK**.

5. From the "Data Encryption" drop-down list, select **TKIP**.



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6. Enter the pre-shared key in both the "Network key" and the "Confirm network key" text boxes.

7. Click **OK**, then **OK** again.

8. When attempting to connect to the wireless network, the login window appears, pre-populated with the pre-shared key. Press **Connect** to connect.

Since the network is now secured, only users who know the pre-shared key will be able to connect. The WPA security protocol is similar to securing network access using a password.



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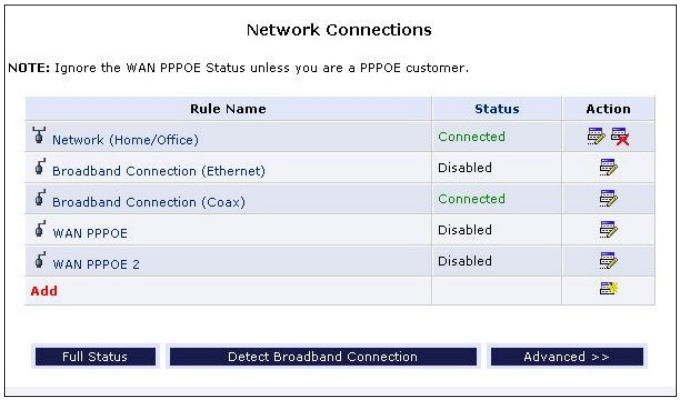
# Using Network Connections

# 5

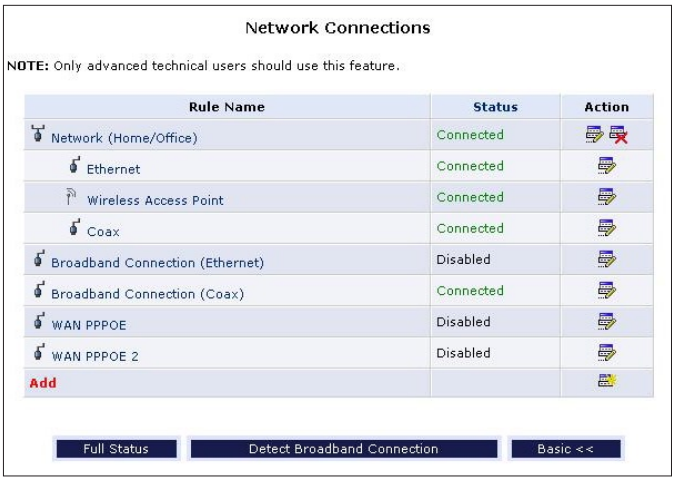
The Wireless Broadband Router supports various local area network (LAN) and wide area network (WAN, on Internet) connections via Ethernet or coaxial cables. Network connections is used to configure the various parameters of the Router's network and Internet connections, and create new connections.

***Caution***: The settings covered in this chapter should be configured by experienced network technicians only.

To access the Router's network connections, in the "My Network" screen, click **Network Connections** from the menu on the left side. The "Network Connections" screen appears.




Click **Advanced** to expand the screen and display all connection entries.



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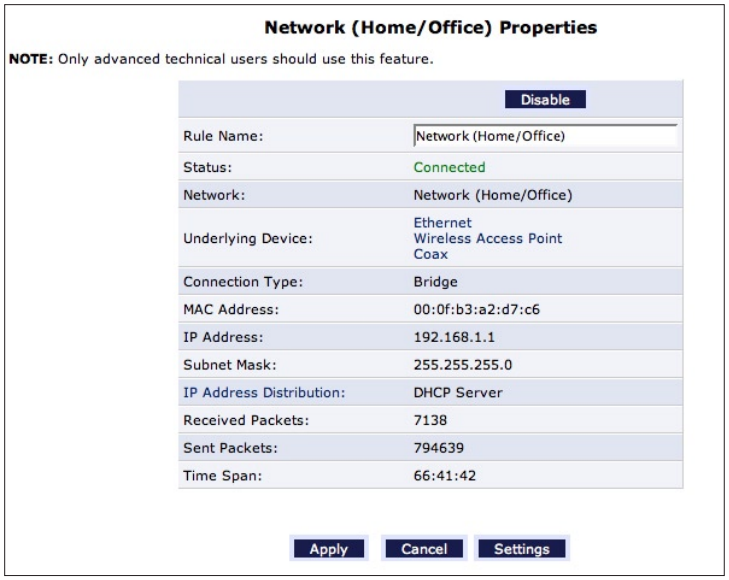
To select a connection, click on its name. The rest of this chapter describes the different network connections available on the Router, as well as the connection types that can be created.

## Network (Home/Office)

Select **Network (Home/Office)** in the Network Connections screen to generate the "Network (Home/Office) Properties" screen. This screen displays a list of the local network's properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the "Rule Name" text box).




☞ ***Note***: When a network is disabled, its formerly underlying devices will not be able to get the DHCP address from the network interface to which they were connected.

The Network (Home/Office) connection is used to combine several network devices under one virtual network. For example, a home/office network can be created for Ethernet and other network devices.



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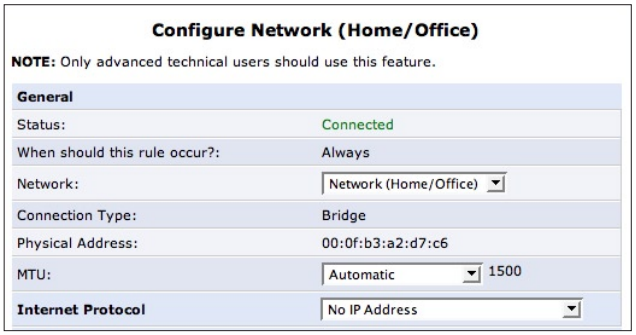
## Configuring the Home/Office Network

Click **Settings** in the "Network (Home/Office) Properties" screen to generate the "Configure Network (Home/Office)" screen.

### *General*

The top part of the Configure Network (Home/Office) screen displays general communication parameters. Actiontec recommends not changing the default values in this section unless familiar with networking concepts.




**Status** Displays the connection status of the network.

**When should this rule occur?** Displays when the rule is active. To schedule rules, see the "Advanced Settings" chapter.

**Network** Select the type of connection being configured from the drop-down list (options: **Broadband Connection**, **Network [Home/Office]**, or **DMZ**).

**Connection Type** Displays the type of connection.

**Physical Address** Displays the physical address of the network card used for the network.

**MTU** MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. "Automatic" sets the MTU at 1500. Other choices include "Automatic by DHCP," which sets the MTU according to the DHCP connection, and "Manual," which allows the MTU to be set manually.



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### *Internet Protocol*

This section has three options: **No IP Address**, **Obtain an IP Address Automatically**, and **Use the Following IP Address**.

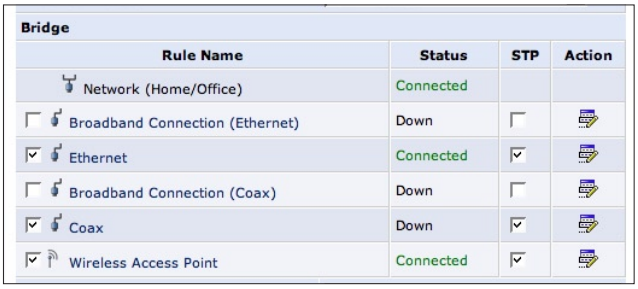
**No IP Address** Select this option if the connection will have no IP address. This is useful if the connection operates under a bridge.

**Obtain an IP Address Automatically** Select this option if the network connection is required by the ISP to obtain an IP address automatically. The server assigning the IP address also assigns a subnet mask address, which can be overridden by entering another subnet mask address.

**Use the Following IP Address** Select this option if the network connection uses a permanent (static) IP address, then the IP address and subnet mask address.

### *Bridge*

The "Bridge" section of the Configure Network (Home/Office) screen is used to specify which networks can join the network bridge.




***Note***: When a network is disabled, its formerly underlying devices inherit the network's DHCP settings. For example, the removal of a network configured as DHCP client automatically configures the devices formerly constituting the network as DHCP clients, with the exact DHCP client configuration.

Click in the check box next to the particular network to specify it. Make sure there are no loops in the network configuration, and apply these settings in case the network consists of multiple switches, or other bridges apart from those created by the Router.

**Status** The "Status" column displays the connection status of a particular device.



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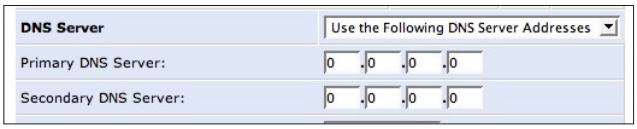
**STP** Click in the device's "STP" check box to enable Spanning Tree Protocol on the device. This protocol provides path redundancy while preventing undesirable loops in the network.

**Action** The "Action" column contains an icon that, when clicked, generates the configuration screen of the particular device.

### *DNS Server*

Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. Specify such an address manually, according to the information provided by the ISP.
To manually configure DNS server addresses, select **Use the Following DNS Server Addresses**. Specify up to two different DNS server addresses, one primary, the other secondary.




### *IP Address Distribution*

The "IP Address Distribution" section of the Configure Network (Home/Office) screen is used to configure the Router's Dynamic Host Configuration Protocol (DHCP) server parameters. DHCP automatically assigns IP addresses to network devices. If enabled, make sure to configure the network devices as "DHCP Clients." There are three options in this section: **Disabled**, **DHCP Server**, and **DHCP Relay**.

**Disabled** Select this option if statically assigning IP addresses to the network devices.

**DHCP Server** To set up the network bridge to function as a DHCP server:

1. Select **DHCP Server**.
2. Enter the IP address at which the Router starts issuing addresses in the "Start IP Address" text boxes. Since the Router's default IP address is 192.168.1.1, the Start IP Address should be 192.168.1.2.
3. Enter the end of the IP address range used to automatically issue IP addresses in the "End IP Address" text boxes. The "maximum" IP address that can be entered here is 192.168.1.253.



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4. Enter the subnet mask address in the "Subnet Mask" text boxes. The subnet mask determines which portion of a destination LAN IP address is the network portion, and which portion is the host portion.

5. If Windows Internet Naming Service (WINS) is being used, enter the WINS server address in the "WINS Server" text boxes.

6. Enter the amount of time a network device will be allowed to connect to the Router with its currently issued dynamic IP address in the "Lease Time in Minutes" text box.

7. Click in the "Provide Host Name If Not Specified by Client" check box to have the Router automatically assign network devices with a host name, in case a host name is not provided by the user.

**DHCP Relay** Select this option to have the Router function as a DHCP relay, and enter the IP address in the screen that appears.

### *Routing*

The Router can be configured to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, while static routing specifies a fixed routing path to neighboring destinations.

There are two options in the "Routing" section of the Configure Network (Home/Office) screen: **Basic** or **Advanced**.

**Basic** Select this option for basic routing operation.

**Advanced** To set up the Router's network bridge for advanced routing:

1. Select **Advanced** from the "Routing" drop-down menu.

2. Enter a device metric in the "Device Metric" text box. The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth and delay time.

3. Click in the "Default Route" check box to define this device as a the default route.

4. Click in the "Multicast - IGMP Proxy Internal" check box to activate multicasting.



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### *Routing Table*

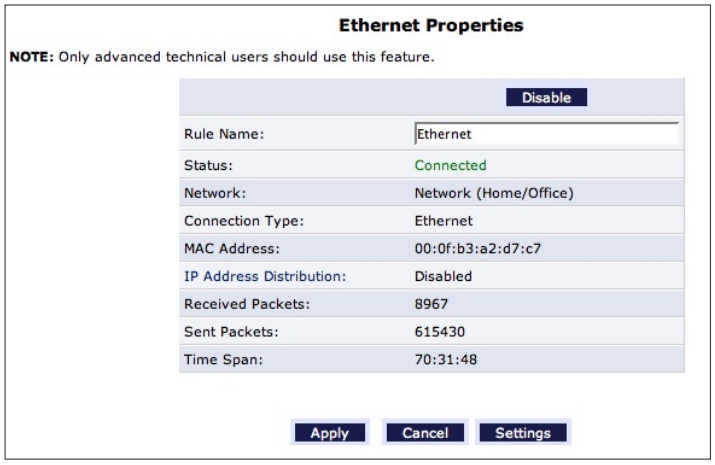
Clicking **New Route** generates the "New Route" window, where a new route can be configured.

### *Additional IP Addresses*

Clicking **New IP Address** generates the "Additional IP Address Settings" screen, where additional IP addresses can be created to access the Router via the Network (Home/Office) connection.

## Ethernet Connection

An Ethernet connection connects computers to the Router using Ethernet cables, either directly or via network hubs and switches. Click **Ethernet** in the Network Connections screen (if needed, click **Advanced** at the bottom of the screen to reveal the "Ethernet" link below "Network [Home/Office]") to generate the "Ethernet Properties" screen. This screen displays a list of the connection's properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the "Rule Name" text box).




*Note*: If disabling the connection, the Router must be rebooted for the change to take effect.



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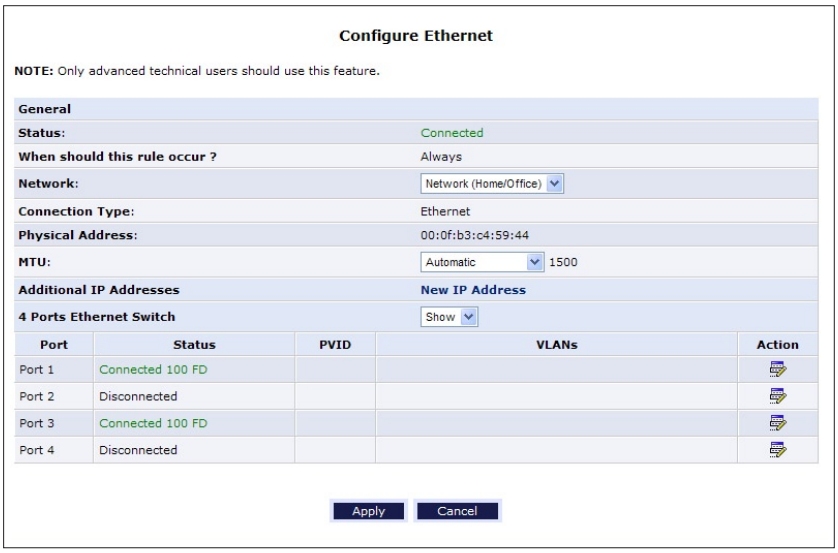
## Configuring the Ethernet Connection

Click **Settings** at the bottom-right of the Ethernet Properties screen to generate the "Configure Ethernet" screen.




### *General*

The top part of the Configure Ethernet screen displays general communication parameters. Actiontec recommends not changing the default values in this section unless familiar with networking concepts.

**Status** Displays the connection status of the Ethernet switch.

**When should this rule occur?** Displays when the rule is active. To schedule rules, see the "Advanced Settings" chapter.

**Network** Select the type of connection being configured from the drop-down list (**Network [Home/Office]**, **Broadband Connection**, or **DMZ**).

**Connection Type** Displays the type of connection.

**Physical Address** Displays the physical address of the network card used for the network.



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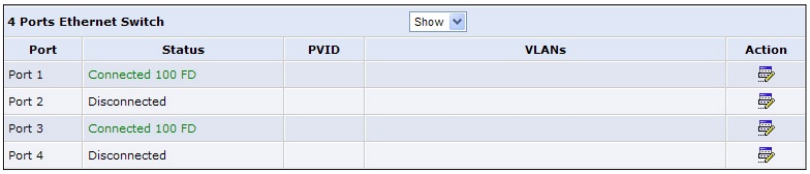
**MTU** MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. "Automatic" sets the MTU at 1500. Other choices include "Automatic by DHCP," which sets the MTU according to the DHCP connection, and "Manual," which allows the MTU to be set manually.

### *Additional IP Addresses*

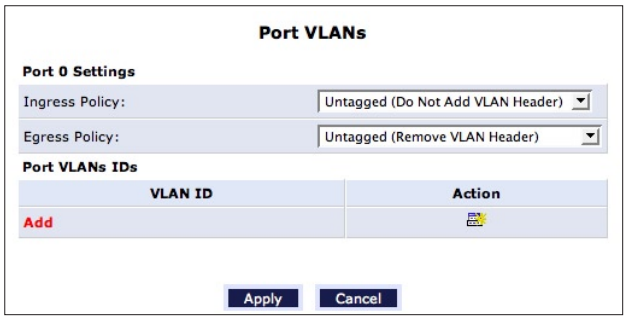
Clicking **New IP Address** generates the "Additional IP Address Settings" screen, where additional IP addresses can be created to access the Router via the Ethernet connection.

### *4 Ports Ethernet Switch*

This section displays the connection status of the Router's four Ethernet ports.




Clicking on a connection's "Action" icon (in the column on the right) generates the "Port VLANs" screen, where ingress and egress policies can be edited.



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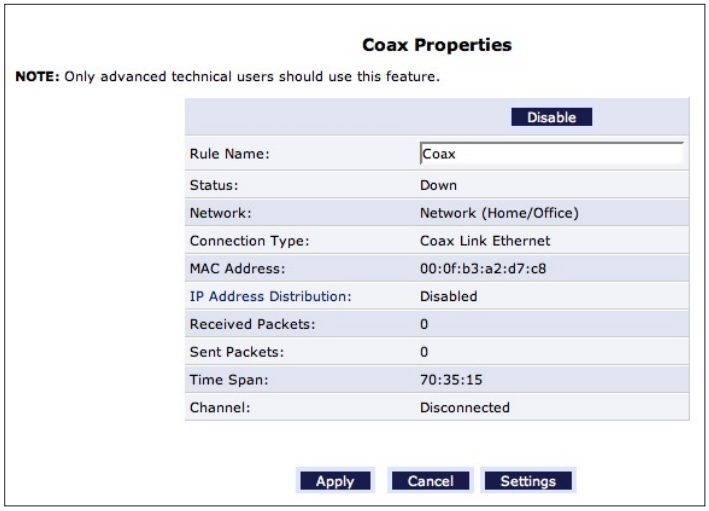
## Coax Connection

A Coax connection connects devices (such as set-top boxes) to the Router using a coaxial cable. Click **Coax** in the Network Connections screen (if needed, click **Advanced** at the bottom of the screen to reveal the "Coax" link below "Network [Home/Office]") to generate the "Coax Properties" screen. This screen displays a list of the connection's properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the "Name" text box).




*Note*: If disabling the connection, the Router must be rebooted for the change to take effect.



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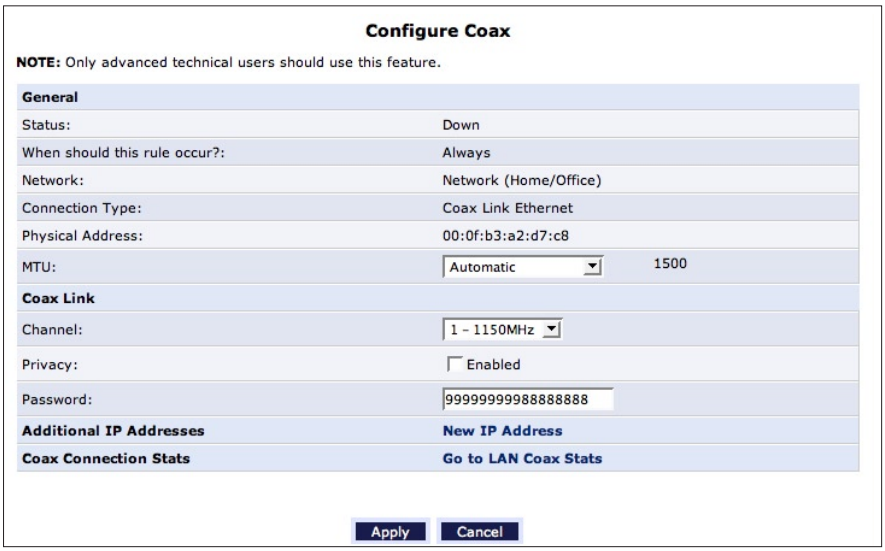
## Configure Coax

Click **Settings** at the bottom-right of the Coax Properties screen generates the "Configure Coax" screen.




### *General*

The top part of the Configure Coax screen displays general communication parameters. Actiontec recommends not changing the default values in this section unless familiar with networking concepts.

**Status** Displays the status of the coax connection.v

**When should this rule occur?** Displays when the rule is active. To schedule rules, see the "Advanced Settings" chapter

**Network** Displays the type of network.

**Connection Type** Displays the type of connection.

**Physical Address** Displays the physical address of the network card used for the network.

**MTU** MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. "Automatic" sets the MTU at 1500. Other choices include "Automatic by DHCP," which sets the MTU according to the DHCP connection, and "Manual," which allows the MTU to be set manually.



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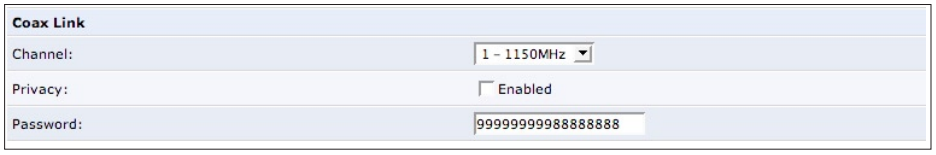
### *Coax Link*

Set up the coax link options in this section of the Configure Coax screen. Options include **Channel**, **Privacy**, and **Password**.




**Channel** Select the Channel from the drop-down list (select from 1-6, or "Automatic").

**Privacy** Toggle "Privacy" by clicking in the "Enabled" check box. If Privacy is activated, all devices connected via coaxial cable must use the same password. Actiontec recommends leaving the Privacy option deactivated.

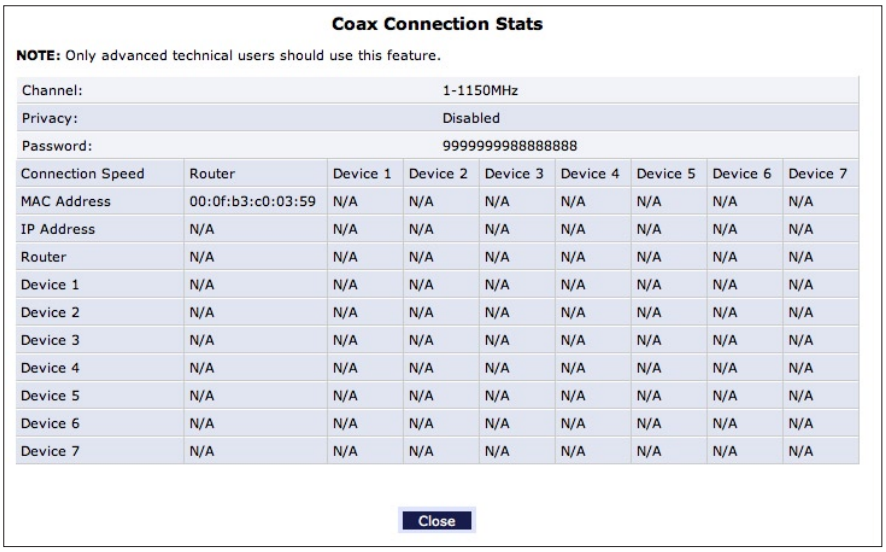
**Password** Enter the Coax Link password in this text box.

### *Additional IP Addresses*

Clicking **New IP Address** generates the "Additional IP Address Settings" screen, where additional IP addresses can be created to access the Router via the Coax Link Ethernet connection.

### *Coax Connection Status*

Click **Go to LAN Coax Stats** to generate the "Coax Connection Status" screen, which gives an overview of all the devices connected to the Router via coaxial cable.




| Connection Speed | Router | Device 1 | Device 2 | Device 3 | Device 4 | Device 5 | Device 6 | Device 7 |
|---|---|---|---|---|---|---|---|---|
| MAC Address | 00:0f:b3:c0:03:59 | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| IP Address | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Router | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Device 1 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Device 2 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Device 3 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Device 4 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Device 5 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Device 6 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Device 7 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |



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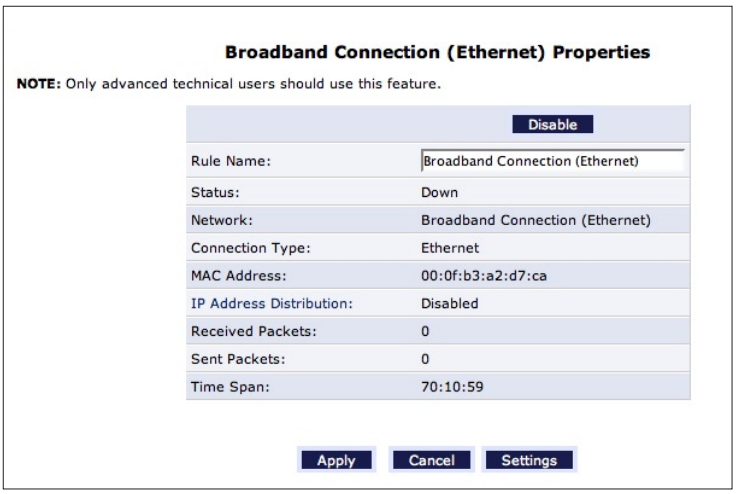
## Broadband Ethernet Connection

A Broadband Ethernet connection connects the Router to the Internet using an Ethernet cable. Click **Broadband Connection (Ethernet)** from the Network Connections screen to generate the "Broadband Connection (Ethernet) Properties" screen. This screen displays a list of the connection's properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the "Rule Name" text box).




☞ ***Note***: If disabling the connection, the Router must be rebooted for the change to take effect.



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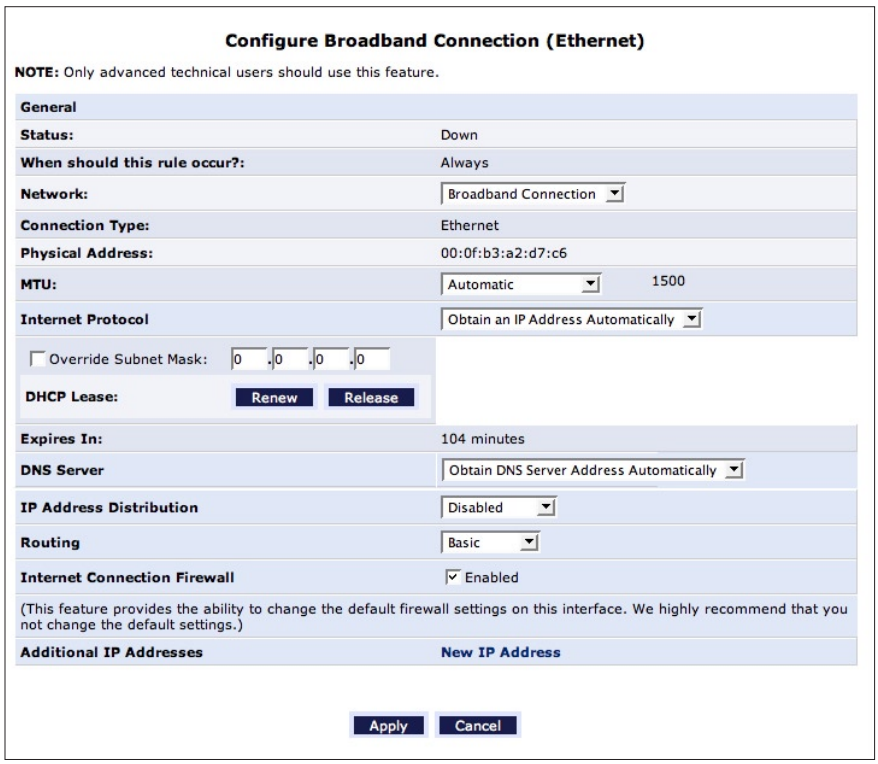
## Configuring the Broadband Ethernet Connection

Click **Settings** at the bottom-right of the Broadband Connection (Ethernet) Properties window to generate the "Configure Broadband Connection (Ethernet)" screen.


Configure Broadband Connection (Ethernet)
NOTE: Only advanced technical users should use this feature.
General
Status: Down
When should this rule occur?: Always
Network: Broadband Connection
Connection Type: Ethernet
Physical Address: 00:0f:b3:a2:d7:c6
MTU: Automatic 1500
Internet Protocol: Obtain an IP Address Automatically
Override Subnet Mask: 0 .0 .0 .0
DHCP Lease: Renew Release
Expires In: 104 minutes
DNS Server: Obtain DNS Server Address Automatically
IP Address Distribution: Disabled
Routing: Basic
Internet Connection Firewall: Enabled
(This feature provides the ability to change the default firewall settings on this interface. We highly recommend that you not change the default settings.)
Additional IP Addresses: New IP Address
Apply
Cancel

### *General*

The top part of the screen displays general communication parameters. Actiontec recommends not changing the default values in this section unless familiar with networking concepts.

**Status** Displays the status of the Ethernet connection ("Down," "Connected," etc.)

**Schedule** Displays when the rule is active. To configure rules, see the "Advanced Settings" chapter.

**Network** Select the type of connection being configured from the drop-down list (options: **Network (Home/Office)**, **Broadband Connection**, or **DMZ**).

**Connection Type** Displays the type of connection. Since this is an Ethernet Connection, "Ethernet" is displayed.

**Physical Address** Displays the physical address of the network card used for the network.



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**MTU** MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. "Automatic, sets the MTU at 1500. Other choices include "Automatic by DHCP," which sets the MTU according to the DHCP connection, and "Manual," which allows the MTU to be set manually.

### *Internet Protocol*

This section includes three options: **No IP Address**, **Obtain an IP Address Automatically**, and **Use the Following IP Address**.

**No IP Address** Select this option if the connection has no IP address. This is useful if the connection is operating under a bridge.

**Obtain an IP Address Automatically** Select this option if the ISP requires the connection to obtain an IP address automatically. The server assigning the IP address also assigns a subnet mask address, which can be overridden by clicking in the "Override Subnet Mask" check box and entering another subnet mask address. Additionally, the DHCP lease can be renewed and/or released by clicking on the appropriate "DHCP Lease" button. The "Expires In" value displays how long until the DHCP lease expires.

**Use the Following IP Address** Select this option if the connection uses a permanent (static) IP address. The ISP should provide this address, along with a subnet mask address, default gateway address, and, optionally, primary and secondary DNS server addresses.

### *DNS Server*

The Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. This connection can be configured to automatically obtain a DNS server address, or such an address can be specified manually, according to the information provided by the ISP.
To configure the connection to automatically obtain a DNS server address, select **Obtain DNS Server Address Automatically** from the "DNS Server" drop-down list. To manually configure DNS server addresses, select **Use the Following DNS Server Addresses**. Specify up to two different DNS server addresses, one primary, the other secondary.



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### *IP Address Distribution*

The "IP Address Distribution" section of the Configure Broadband Connection (Ethernet) screen is used to configure the Router's Dynamic Host Configuration Protocol (DHCP) server parameters. DHCP automatically assigns IP addresses to network devices. If enabled, make sure to configure the network devices as "DHCP Clients." There are three options in this section: **Disabled**, **DHCP Server**, and **DHCP Relay**.

***Caution***: Actiontec strongly recommends leaving this setting at "Disabled."

**Disabled** Select this option if statically assigning IP addresses to the network devices.

**DHCP Server** To set up the Router to function as a DHCP server:

1. Select **DHCP Server.**
2. Enter the IP address at which the Router starts issuing addresses in the "Start IP Address" text boxes. Since the Router's default IP address is 192.168.1.1, the Start IP Address must be 192.168.1.2 or higher.
3. Enter the end of the IP address range used to automatically issue IP addresses in the "End IP Address" text boxes.
4. Enter the subnet mask address in the "Subnet Mask" text boxes. The subnet mask determines which portion of a destination LAN IP address is the network portion, and which portion is the host portion.
5. If a Windows Internet Naming Service (WINS) is being used, enter the WINS server address in the "WINS Server" text boxes.
6. Enter the amount of time a network device will be allowed to connect to the Router with its currently issued dynamic IP address in the "Lease Time in Minutes" text box. Just before the time is up, the device's user will need to make a request to extend the lease or get a new IP address.
7. Click in the "Provide Host Name If Not Specified by Client" check box to have the Router automatically assign network devices with a host name, in case a host name is not provided by the user.



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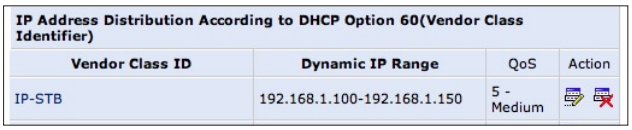
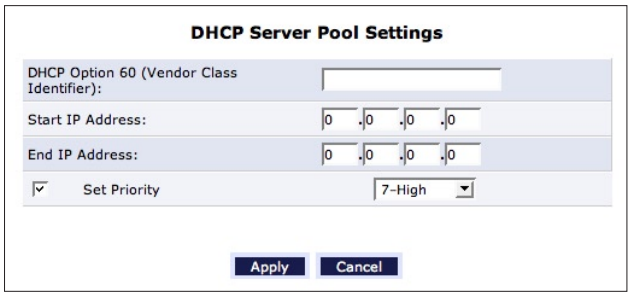
**DHCP Relay** Select this option to have the Router function as a DHCP relay, and enter the IP address in the screen that appears.




To add a new product or product family, click **New IP Range**. This generates the "DHCP Server Pool Settings" screen. Set the device name, IP range, and priority level in the appropriate text boxes.




### *Routing*

The Router can be configured to use static or dynamic routing. Dynamic routing automatically adjusts how packets travel on the network, while static routing specifies a fixed routing path to neighboring destinations.

There are two options in the "Routing" section of the "Configure WAN Coax Link Ethernet" screen: **Basic** or **Advanced**.

**Basic** Select this option for basic routing operation.

**Advanced** To set up the Router's Broadband Ethernet connection for advanced routing:

1. Select **Advanced** from the Routing drop-down menu.
2. Enter a device metric in the "Device Metric" text box. The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth and delay time.
3. Click in the "Default Route" check box to define this device as a the default route.
4. Click in the "Multicast - IGMP Proxy Internal" check box to activate multicasting.



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### *Routing Table*

Clicking **New Route** generates the "New Route" window, where a new route can be configured.

### *Internet Connection Firewall*

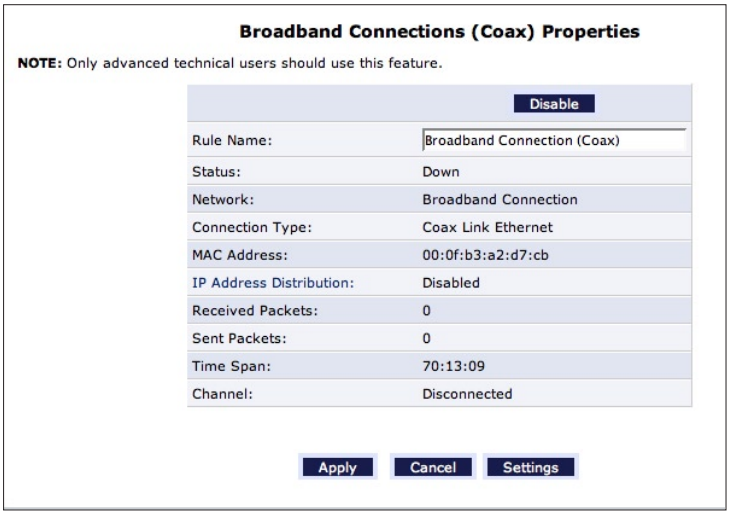
Click in the "Enabled" check box to activate the Router's firewall on the connection.

### *Additional IP Addresses*

Clicking **New IP Address** generates the "Additional IP Address Settings" screen, where additional IP addresses can be created to access the Router via the connection.

## Coax Broadband Connection

A Coax Broadband connection connects the Router to the Internet using a coaxial cable. Click **Broadband Connection (Coax)** in the Network Connections screen to generate the "Broadband Connection (Coax) Properties" screen. This screen displays a list of the connection's properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the "Name" text box).




***Note***: If disabling the connection, the Router must be rebooted for the change to take effect.



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## Configuring the Coax Broadband Connection

Click **Settings** at the bottom of the Broadband Connection (Coax) Properties screen to generate the "Configure Broadband Connection (Coax)" screen.

Configure Broadband Connection (Coax)
NOTE: Only advanced technical users should use this feature.
General
Status: Down
When should this rule occur?: Always
Network: Broadband Connection
Connection Type: Coax
Physical Address: 00:0f:b3:a2:d7:c6
MTU: Automatic 1500
Coax Link
Privacy: Enabled
Password: 99999999988888888
WAN Coax Connection Speeds:
Router Tx(Mbps): 0
Router Rx(Mbps): 0
Internet Protocol: Obtain an IP Address Automatically
Override Subnet Mask: 0 .0 .0 .0
DHCP Lease: Renew Release
DNS Server: Obtain DNS Server Address Automatically
IP Address Distribution: Disabled
Routing: Basic
Internet Connection Firewall: Enabled
(This feature provides the ability to change the default firewall settings on this interface. We highly recommend that you not change the default settings.)
Additional IP Addresses: New IP Address
Apply Cancel

### *General*

The top part of the screen displays general communication parameters. Actiontec recommends not changing the default values in this section unless familiar with networking concepts.

**Status** Displays the status of the connection ("Down," "Connected," etc.).

**When should this rule occur?** Displays when the rule is active. To schedule rules, see the "Advanced Settings" chapter.

**Network** Displays the type of network to which the link is connected. Since this is a broadband connection (connected to the Internet), "Broadband Connection is displayed.

**Connection Type** Displays the type of connection. Since this is a coaxial connection, "Coax" is displayed.



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**Physical Address** Displays the physical address of the network card used for the network.

**MTU** MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. "Automatic" sets the MTU at 1500. Other choices include "Automatic by DHCP," which sets the MTU according to the DHCP connection, and "Manual," which allows the MTU to be set manually.

### *Coax Link*

Configure the coax link connection in this section of the screen.

**Privacy** Toggle "Privacy" by clicking in the "Enabled" check box. If Privacy is activated, all devices connected via coaxial cable must use the same password. Actiontec recommends leaving the Privacy option deactivated.

**Password** Enter the Coax Link password here.

### *WAN Coax Connection Speeds*

This section displays the Router's Tx and Rx speeds (in Mbps).

### *Internet Protocol*

This section includes three options: **No IP Address**, **Obtain an IP Address Automatically**, and **Use the Following IP Address**.

**No IP Address** Select this option if the connection has no IP address. This is useful when the connection is operating under a bridge.

**Obtain an IP Address Automatically** Select this option if the ISP requires the connection to obtain an IP address automatically. The server assigning the IP address also assigns a subnet mask address, which can be overridden by clicking in the "Override Subnet Mask" check box and entering another subnet mask address. Additionally, the DHCP lease can be renewed and/or released by clicking on the appropriate "DHCP Lease" button. The "Expires In" value displays how long until the DHCP lease expires.

**Use the Following IP Address** Select if the WAN connection is configured using a permanent (static) IP address. The ISP should provide this address, along with a subnet mask address, default gateway address, and, optionally, primary and secondary DNS server addresses.



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### *DNS Server*

Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. The connection can be set to automatically obtain a DNS server address, or an address can be set manually, according to information provided by the ISP.

To configure the connection to automatically obtain a DNS server address, select **Obtain DNS Server Address Automatically** from the "DNS Server" drop-down list. To manually configure DNS server addresses, select **Use the Following DNS Server Addresses**. Specify up to two different DNS server addresses, one primary, the other secondary.

### *IP Address Distribution*

The "IP Address Distribution" section of the Configure Broadband Connection (Coax) screen allows the user to configure the Router's Dynamic Host Configuration Protocol (DHCP) server parameters. The DHCP automatically assigns IP addresses to network devices. If enabled, make sure to configure the network devices as "DHCP Clients." There are three options in this section: **Disabled**, **DHCP Server,** and **DHCP Relay**.

***Caution***: Actiontec strongly recommends leaving this setting at "Disabled."

**Disabled** Select this option if statically assigning IP addresses to the network devices.

**DHCP Server** To set up the WAN Coax Link Ethernet connection to function as a DHCP server:

1. Select **DHCP Server**.
2. Enter the IP address at which the Router starts issuing addresses in the "Start IP Address" text boxes. Since the Router's default IP address is 192.168.1.1, the Start IP Address must be 192.168.1.2.
3. Enter the end of the IP address range used to automatically issue IP addresses in the "End IP Address" text boxes.
4. Enter the subnet mask address in the "Subnet Mask" text boxes. The subnet mask determines which portion of a destination LAN IP address is the network portion, and which portion is the host portion.



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5. If a Windows Internet Naming Service (WINS) is being used, enter the WINS server address in the "WINS Server" text boxes.

6. Enter the amount of time a network device will be allowed to connect to the Router with its currently issued dynamic IP address in the "Lease Time in Minutes" text box. Just before the time is up, the device's user will need to make a request to extend the lease or get a new IP address.

7. Click in the "Provide Host Name If Not Specified by Client" check box to have the Router automatically assign network devices with a host name, in case a host name is not provided by the user.

**DHCP Relay** Select this option to have the Router function as a DHCP relay, and enter the IP address in the screen that appears.

### *Routing*

The Router can be configured to use dynamic routing. Dynamic routing automatically adjusts how packets travel on the network There are two options in the "Routing" section of the Configure Broadband Connection (Coax) screen: **Basic** or **Advanced**.

***Warning:*** Do not use static routing unless instructed to do so by Verizon.

**Basic** Select this option for basic routing operation.

**Advanced** To set up the Router's Coax broadband connection for advanced routing:

1. Select **Advanced** from the Routing drop-down list.

2. Enter a device metric in the "Device Metric" text box. The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth and delay time.

3. Click in the "Default Route" check box to define this device as the default route.

4. Click in the "Multicast - IGMP Proxy Internal" check box to activate multicasting.



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### *Routing Table*

Click **New Route** to generate the "New Route" window, where a new route can be configured.

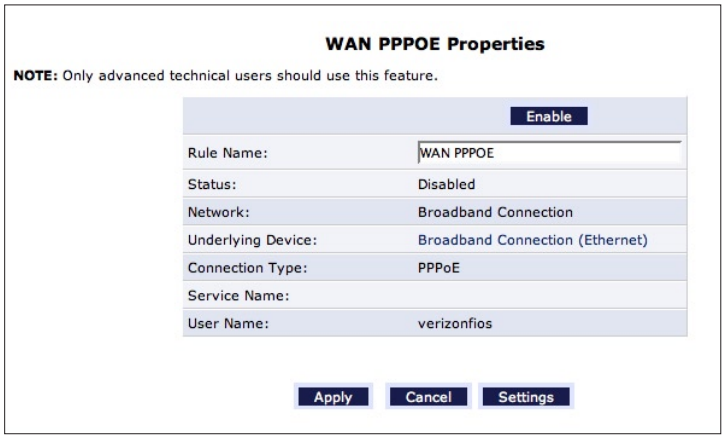
### *Additional IP Addresses*

Click **New IP Address** to generate the "Additional IP Address Settings" screen, where additional IP addresses can be created to access the Router via the connection.

## WAN PPPoE/WAN PPPoE 2

WAN Point-to-Point Protocol over Ethernet (PPPoE) relies on two widely accepted standards: Point-to-Point Protocol and Ethernet. PPPoE enables Ethernet networked computers to exchange information with computers on the Internet. PPPoE supports the protocol layers and authentication widely used in PPP and enables a point-to-point connection to be established in the normally multipoint architecture of Ethernet. A discovery process in PPPoE determines the Ethernet MAC address of the remote device in order to establish a session.

Click **WAN PPPoE** in the Network Connections screen to generate the "WAN PPPoE Properties" screen. This screen displays a list of the connection's properties. The only modifications that can be made from this screen are disabling the connection (by clicking **Disable**) or renaming the connection (by entering a new name in the "Name" text box).



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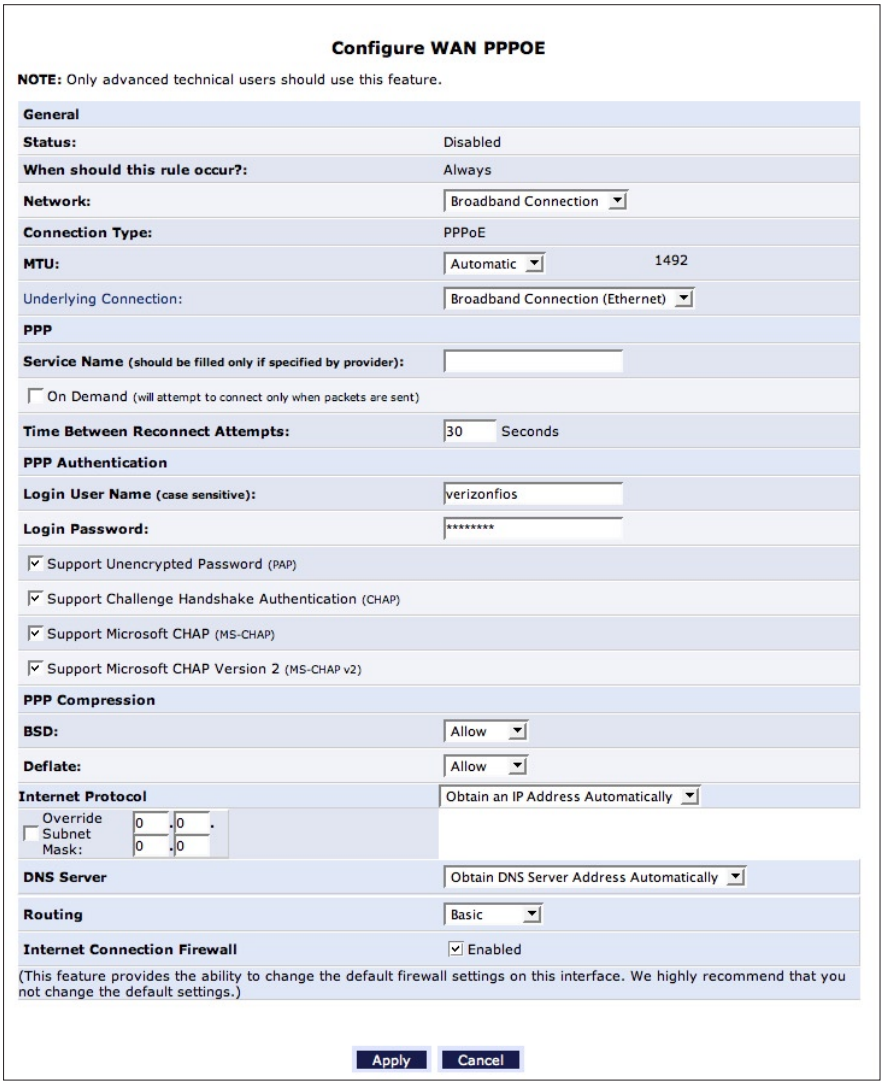
## Configuring the WAN PPPoE Connection

Click **Settings** in the WAN PPPoE Properties screen to generate the "Configure WAN PPPoE" screen.


Configure WAN PPPOE
NOTE: Only advanced technical users should use this feature.
General
Status: Disabled
When should this rule occur?: Always
Network: Broadband Connection
Connection Type: PPPoE
MTU: Automatic 1492
Underlying Connection: Broadband Connection (Ethernet)
PPP
Service Name (should be filled only if specified by provider):
On Demand (will attempt to connect only when packets are sent)
Time Between Reconnect Attempts: 30 Seconds
PPP Authentication
Login User Name (case sensitive): verizonfios
Login Password: ********
Support Unencrypted Password (PAP)
Support Challenge Handshake Authentication (CHAP)
Support Microsoft CHAP (MS-CHAP)
Support Microsoft CHAP Version 2 (MS-CHAP v2)
PPP Compression
BSD: Allow
Deflate: Allow
Internet Protocol: Obtain an IP Address Automatically
Override Subnet Mask: 0 . 0 . 0 . 0
DNS Server: Obtain DNS Server Address Automatically
Routing: Basic
Internet Connection Firewall: Enabled
(This feature provides the ability to change the default firewall settings on this interface. We highly recommend that you not change the default settings.)
Apply
Cancel

### *General*

The top part of the Configure WAN PPPoE screen displays general communication parameters. Actiontec recommends not changing the default values in this section unless familiar with networking concepts.

**Status** Displays the connection status of the WAN PPPoE connection. ("Down," "Disabled," "Connected," etc.)

**When should this rule occur?** Displays when the rule is active. To schedule rules, see "Advanced Settings" chapter.



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**Network** Select the type of connection being configured from the drop-down list (**Broadband Connection**, **Network (Home/Office)**, or **DMZ**).

**Connection Type** Displays the type of connection. Since this is PPPoE connection, "PPPoE" is displayed.

**MTU** MTU (Maximum Transmission Unit) specifies the largest packet size permitted for Internet transmission. "Automatic, sets the MTU at 1492. Other choices include "Automatic," which sets the MTU according to the connection to the ISP, and "Manual," which allows the MTU to be set manually.

**Underlying Connection** Specify the underlying connection above which the protocol initiates from the drop-down list, which displays all possible underlying devices.

### *PPP Configuration*

Point-to-Point Protocol (PPP) is the most popular method for transporting packets between the user and the ISP.

**Service Name** Specify the networking peer's service name, if provided by the ISP, in this text box.

**On-Demand** To use PPP on demand to initiate the point-to-point protocol session only when packets are actually sent over the Internet, click in this check box. This option should be active on a limited basis

**Idle Time Before Hanging Up** Enter the amount of idle time, in minutes, before the PPP session automatically ends .

**Time Between Reconnect Attempts** In this text box, specify the duration between PPP reconnect attempts, as provided by the ISP.

### *PPP Authentication*

Point-to-Point Protocol (PPP) currently supports four authentication protocols: **Password Authentication Protocol** (PAP), **Challenge Handshake Authentication Protocol** (CHAP), and **Microsoft CHAP versions 1 and 2**. Select the authentication protocols the Router may use when negotiating with a PPTP server in this section. Select all the protocols if no information is available about the server's authentication methods. Note that encryption is performed only if Microsoft CHAP, Microsoft CHAP version 2, or both are selected.

***Warning:*** The PPP Authentication settings should not be changed unless instructed to do so by Verizon.



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**Login User Name** Enter the user name (provided by the ISP) in this text box.

**Login Password** Enter the password (provided by the ISP) in this text box.

**Support Unencrypted Password (PAP)** Password Authentication Protocol (PAP) is a simple, plain-text authentication scheme. The user name and password are requested by the networking peer in plain-text. PAP, however, is not a secure authentication protocol. Man-in-the-middle attacks can easily determine the remote access client's password. PAP offers no protection against replay attacks, remote client impersonation, or remote server impersonation.

**Support Challenge Handshake Authentication (CHAP)** Click in this check box to activate CHAP, a challenge-response authentication protocol that uses MD5 to hash the response to a challenge. CHAP protects against replay attacks by using an arbitrary challenge string per authentication attempt.

**Support Microsoft CHAP** Click in this check box if communicating with a peer that uses Microsoft CHAP authentication protocol.

**Support Microsoft CHAP Version 2** Select this check box if communicating with a peer that uses Microsoft CHAP Version 2 authentication protocol.

### *PPP Compression*

The PPP Compression Control Protocol (CCP) is responsible for configuring, enabling, and disabling data compression algorithms on both ends of the point-to-point link. It is also used to signal a failure of the compression/ decompression mechanism in a reliable manner.

For each compression algorithm (**BSD** and **Deflate**), select one of the following from the drop-down list:

**Reject** Selecting this option rejects PPP connections with peers that use the compression algorithm. If Reject is activated, throughput may diminish.

**Allow** Selecting this option allows PPP connections with peers that use the compression algorithm.

**Require** Selecting this option insures a connection with a peer using the compression algorithm.



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### *Internet Protocol*

Select one of the following Internet Protocol options from the "Internet Protocol" drop-down list:

**Obtain an IP Address Automatically** This option is selected by default. Change only if required by the ISP. The server that assigns the Router with an IP address also assigns a subnet mask. Override the dynamically assigned subnet mask by selecting the "Override Subnet Mask" and entering a different subnet mask.

**Use the Following IP Address** Select this option to configure the Router to use a permanent (static) IP address. The ISP should provide this address.

### *DNS Server*

The Domain Name System (DNS) is the method by which website or domain names are translated into IP addresses. The Router can be configured to automatically obtain a DNS server address, or the address can be entered manually, according to the information provided by the ISP.
To configure the connection to automatically obtain a DNS server address, select **Obtain DNS Server Address Automatically** from the "DNS Server" drop-down list. To manually configure DNS server addresses, select **Use the Following DNS Server Addresses** from the "DNS Server" drop-down list. Up to two different DNS server addresses can be entered (Primary and Secondary).

### *Routing*

Select **Advanced** or **Basic** from the "Routing" drop-down list. If Advanced is selected, additional options appear, as listed below.

**Routing Mode** Select one of the following Routing modes:

- **Route** - Select this option to cause the Router to act as a router between two networks.
- **NAT** - Select this option to activate Network Address Translation (NAT), which translates IP addresses to a valid, public address on the Internet. NAT adds security, since the IP addresses of the devices on the network are not transmitted over the Internet. In addition, NAT allows many addresses to exist behind a single valid address. Use the NAT routing mode only if the local network consists of a single device, or collisions may occur if more than one device attempts to communicate using the same port.



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- **NAPT** - Select this option to activate NAPT (Network Address and Port Translation), which refers to network address translation involving the mapping of port numbers and allows multiple machines to share a single IP address. Use NAPT if the local network contains multiple devices, a topology that necessitates port translation in addition to address translation.

**Device Metric** The device metric is a value used by the Router to determine whether one route is superior to another, considering parameters such as bandwidth, delay, and more.

**Default Route** Click in this check box to define the connection as a the default route.

**Multicast - IGMP Proxy Default** Click in this check box to enable the Router to issue IGMP (Internet Group Management Protocol) host messages on behalf of hosts the Router discovers through standard IGMP interfaces. IGMP proxy enables the routing of multicast packets according to the IGMP requests of local network devices asking to join multicast groups.

### *Routing Table*

Clicking **New Route** generates the "New Route" window, where a new route can be configured.

### *Internet Connection Firewall*

Click in the "Enabled" check box to activate the Router's firewall on the WAN PPPoE connection.



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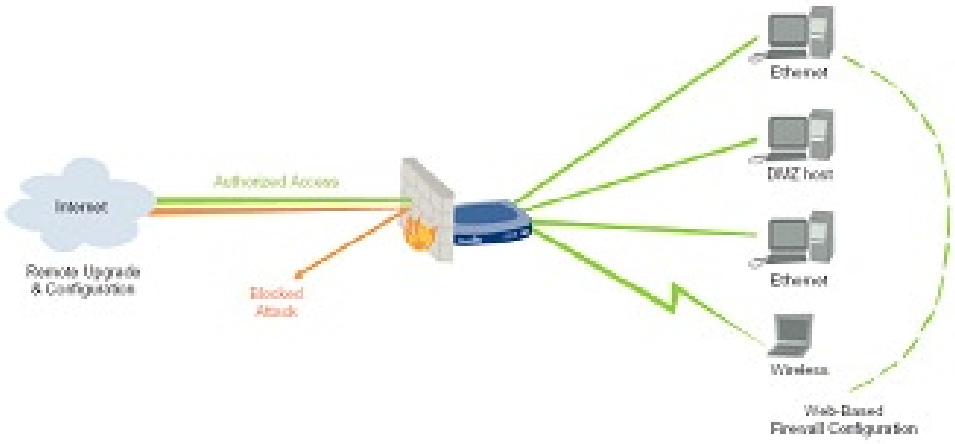
# Configuring the Router's Security

# 6

The Wireless Broadband Router's security suite includes comprehensive and robust security services: Stateful Packet Inspection, a firewall, user authentication protocols, and password protection mechanisms. These features allow users to connect their computers to the Internet and be protected from the security threats.

The Router's firewall is the cornerstone of the Router's security suite. It has been exclusively tailored to the needs of the residential/office user and is pre-configured to provide optimum security.




The firewall provides both the security and flexibility home and office users seek. It provides a managed, professional level of network security while enabling the safe use of interactive applications, such as Internet gaming and video-conferencing.

Additional features, including surfing restrictions and access control, can also be configured locally through the Router's MegaControl Panel, or remotely by a service provider.

The firewall also supports advanced filtering, designed to allow comprehensive control over the firewall's behavior. Specific input and output rules can be defined, the order of logically similar sets of rules can be controlled, and distinctions between rules that apply to Internet and local network devices can be made.



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This chapter covers these Security features:

- **General** - select the security level for the firewall.
- **Access Control** - restrict access from the local network to the Internet.
- **Port Forwarding** - enable access from the Internet to specified services provided by computers on the local network.
- **DMZ Host** - configure a network host to receive all traffic arriving at the Router which does not belong to a known session.
- **Port Triggering** - define port triggering entries to dynamically open the firewall for some protocols or ports.
- **Remote Administration** - enable remote configuration of the Router from any Internet-accessible computer.
- **Website Blocking** - block network access to a certain hosts or websites on the Internet.
- **Static NAT** - allow multiple static NAT IP addresses to be designated to devices on the network.
- **Advanced Filtering** - control the firewall's settings and rules.
- **Security Log** - view and configure the security log.



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## General

The "General" screen is used to configure the Router's basic security settings.

General
Maximum Security (High)
Inbound Policy: Reject.
Remote Administration settings will override the security inbound policy.
Outbound Policy: Reject.
Outbound access is allowed to the following services: Telnet, FTP, HTTP, HTTPS, DNS, IMAP, POP3 and SMTP.
Typical Security (Medium)
Inbound Policy: Reject.
Remote Administration settings will override the security inbound policy.
Outbound Policy: Accept.
Minimum Security (Low)
Inbound Policy: Accept.
Outbound Policy: Accept.
Block IP Fragments
Apply
Cancel

The firewall regulates the flow of data between the local network and the Internet. Both incoming and outgoing data are inspected and then either accepted (allowed to pass through the Router) or rejected (barred from passing through the Router) according to a flexible and configurable set of rules. These rules are designed to prevent unwanted intrusions from the outside, while allowing local network users access to required Internet services.

The firewall rules specify what types of services available on the Internet can be accessed from the local network and what types of services available in the local network can be accessed from the Internet. Each request for a service the firewall receives, whether originating in the Internet or from a computer in the local network, is checked against the firewall rules to determine whether the request should be allowed to pass through the firewall. If the request is permitted to pass, all subsequent data associated with this request (a "session") will also be allowed to pass, regardless of its direction.

For example, when accessing a website on the Internet, a request is sent out to the Internet for this site. When the request reaches the Router, the firewall identifies the request type and origin (HTTP and a specific computer in the local network, in this case). Unless the Router is configured to block requests of this type from this computer, the firewall allows this request to pass out onto the Internet. When the website is returned from the web server, the firewall will associate it with this session and allow it to pass, regardless of whether HTTP access from the Internet to the local network is blocked or permitted.



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Note that it is the origin of the request, not subsequent responses to this request, which determines whether a session can be established or not.

The Router features three pre-defined security levels: **Minimum**, **Typical**, and **Maximum**. The table below summarizes the behavior of the Router for each of the three security levels.

| Security Level | Requests from the Internet (incoming traffic) | Requests from the local network (outgoing traffic) |
|---|---|---|
| **Maximum Security** | **Blocked** - No access to local network from Internet, except as configured in the Port Forwarding, DMZ host, and Remote Access screens. | **Limited** - Only commonly used services, such as web browsing and E-mail, are permitted. |
| **Typical Security** | **Blocked** - No access to local network from Internet, except as configured in the Port Forwarding, DMZ host, and Remote Access screens. | **Unrestricted** - All services are permitted, except as configured in the Access Control screen. |
| **Minimum Security** | **Unrestricted** - Permits full access from Internet to local network; all connection attempts permitted. | **Unrestricted** - All services are permitted, except as configured in the Access Control screen. |

These services include Telnet, FTP, HTTP, HTTPS, DNS, IMAP, POP3 and SMTP.

☞ ***Note:*** Some applications (such as some Internet messengers and Peer-To-Peer client applications) tend to use these ports if they cannot connect with their own default ports. When applying this behavior, these applications will not be blocked outbound, even at the Maximum Security level.

To configure the Router's security settings:

1. From the General screen, select a security level by clicking the appropriate radio button. Using the Minimum Security setting may expose the local network to significant security risks, and thus should only be used for short periods of time.



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2. Check the "Block IP Fragments" box to protect the local network from a common type of hacker attack that uses fragmented data packets to sabotage the network. Note that VPN over IPSec and some UDP-based services make legitimate use of IP fragments. IP fragments must be allowed to pass into the local network to use these services.

3. Click **Apply** to save changes.

## Access Control

Access control is used to block specific computers within the local network (or even the whole network) from accessing certain services on the Internet. For example, one computer can be prohibited from surfing the Internet, another computer from transferring files using FTP, and the whole network from receiving incoming E-mail.

Access control defines restrictions on the types of requests that can pass from the local network out to the Internet, and thus may block traffic flowing in both directions. In the E-mail example given above, computers in the local network can be prevented from receiving E-mail by blocking their outgoing requests to POP3 servers on the Internet.

Access control also incorporates a list of preset services in the form of applications and common port settings.



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## Allow or Restrict Services

To view and allow/restrict these services:

1. Select **Access Control** from the left side of any Security screen. The "Access Control" screen appears.

☞ ***Note:*** The "Allowed" section is only visible when the firewall is set to "Maximum."

2. Click **Add**. The "Add Access Control Rule" screen appears.

☞ ***Note:*** To block a service, click **Add** in the "Blocked" section of the Access Control screen. To allow outgoing traffic, click **Add** in the "Allowed" section of the screen.

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3. If this access control rule applies to all networked devices, select "Any" from the "Networked Computer/Device" list box. If this rule applies to certain devices only, select "Specify Address" and click **Add**. Then, create and add a network object (for more details about adding network objects, see the "Advanced Settings" chapter of this manual).

4. Select the Internet protocol to be allowed or blocked from the "Protocol" drop-down list.

5. If the rule will be active all the time, select **Always** from the "When should this rule occur?" drop-down list. If the rule will only be active at certain times, select **Specify Schedule** and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the "Advanced Settings" chapter of this manual).

6. Click **Apply** to save the changes. The Access Control screen will display a summary of the new access control rule.

***Note:*** To block a service not included in the list, select **Specify Protocol** from the Protocol drop-down menu. The "Edit Service" screen appears. Define the service, then click **OK**. The service will then be automatically added to the top section of the "Add Access Control Rule" screen, and will be selectable.

An access control can be disabled and the service made available without having to remove the service from the Access Control table. This may be useful to make the service available temporarily, with the expectation that the restriction will be reinstated later.

- To temporarily disable an access control, clear the check box next to the service name.
- To reinstate the restriction at a later time, select the check box next to the service name.
- To remove an access restriction from the Access Control table, click **Remove** for the service. The service will be removed from the Access Control table.



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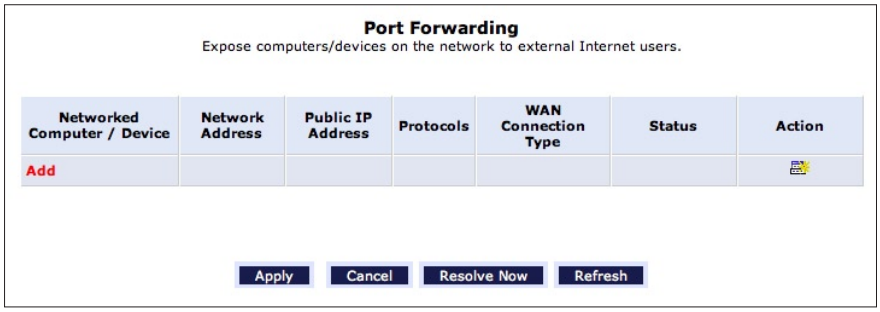
## Port Forwarding

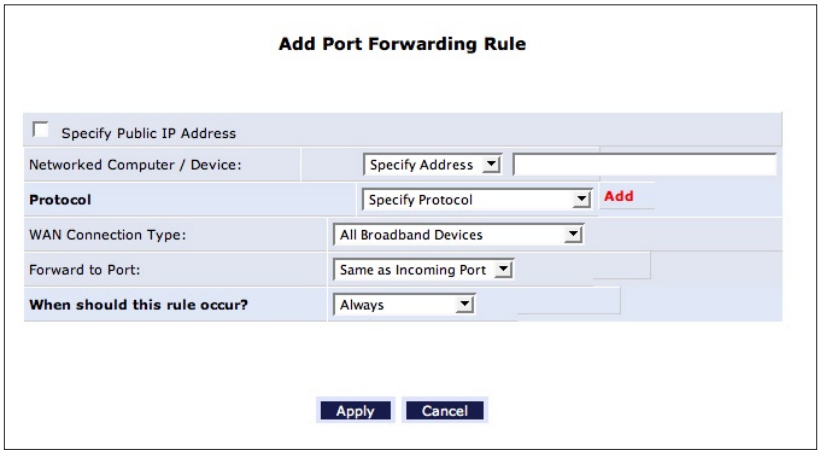
In its default state, the Router blocks all external users from connecting to or communicating with the network, making it safe from hackers who may try to intrude on the network and damage it. However, the network can be exposed to the Internet in certain limited and controlled ways to enable some applications to work from the local network (game, voice, and chat applications, for example) and to enable Internet access to servers in the network. Port forwarding (sometimes referred to as local servers) supports both of these functions.

To grant Internet users access to servers inside the local network, each service provided, as well as the computer providing it, must be identified. To do this:

1. Select **Port Forwarding** from the left side of any Security screen. The "Port Forwarding" screen appears.




2. Click **Add**. The "Add Port Forwarding Rule" screen appears.




3. Enter the local IP address or the host name of the computer providing the service in the "Networked Computer/Device" text box, or select them from the drop-down list. Note that only one local network computer can be assigned to provide a specific service or application.



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4. Select the Internet protocol to be provided from the "Protocol" drop-down list. To see all options, select **All Services**.

5. Select a WAN connection type from the "WAN Connection Type" drop-down list. Actiontec recommends selecting **All Broadband Devices**.

6. To select a port to forward communications to (this is optional), select **Specify** from the "Forward to Port" drop-down list, then, in the text box that appears, enter the port number. If no port is identified, select **Same as Incoming Port**.

7. If this port will be active all the time, select **Always** from the "When should this rule occur?" drop-down list. If the rule will only be active at certain times, select **Specify Schedule** and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the "Advanced Settings" chapter of this manual).

8. Click **Apply** to save the changes.

How many computers can use a service or play a game simultaneously? Well, the answer may be a bit confusing. All the computers on the network can behave as clients and use a specific service simultaneously. Being a client means the computer within the network initiates the connection; for example, a computer on the network can open an FTP connection with an FTP server on the Internet. But only one computer on the network can operate as a server and respond to requests from computers on the Internet (outside the local network).

## DMZ (Demilitarized Zone) Host

The DMZ host feature allows one device on the network to operate outside the firewall. Designate a DMZ host:

- To use an Internet service, such as an online game or video-conferencing program, not present in the Port Forwarding list and for which no port range information is available.

- To expose one computer to all services without restriction or security.

***Warning:*** A DMZ host is not protected by the firewall and may be vulnerable to attack. Designating a DMZ host may also put other computers in the local network at risk. When designating a DMZ host, consider the security implications and protect it if necessary.



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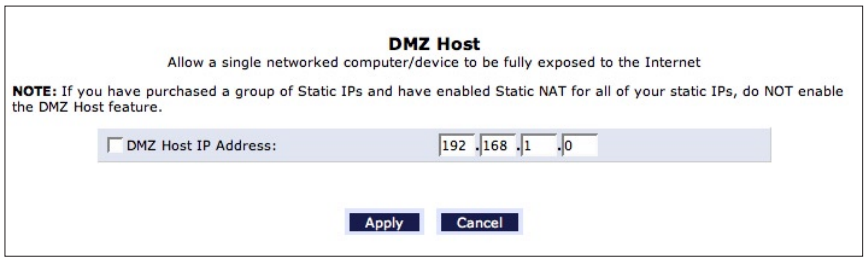
To designate a local computer as a DMZ host:

1. Select **DMZ Host** from the left side of any Security screen. The "DMZ Host" screen appears.


DMZ Host
Allow a single networked computer/device to be fully exposed to the Internet
NOTE: If you have purchased a group of Static IPs and have enabled Static NAT for all of your static IPs, do NOT enable the DMZ Host feature.
DMZ Host IP Address:
192 .168 .1 .0
Apply
Cancel

2. Click in the "DMZ Host IP Address" check box, then enter the IP address of the computer to be designated as a DMZ host. Note that only one network computer can be a DMZ host at any time.

3. Click **Apply**.

Click in the "DMZ Host IP Address" check box again to disable the DMZ host.

## Port Triggering

Port triggering can be used for dynamic port forwarding configuration. By setting port triggering rules, inbound traffic is allowed to arrive at a specific network host using ports different than those used for the outbound traffic. The outbound traffic triggers which ports inbound traffic is directed.

For example, a gaming server is accessed using UDP protocol on port 2222. The gaming server responds by connecting the user using UDP on port 3333 when starting gaming sessions. In this case, port triggering must be used, since it conflicts with the following default firewall settings:

- The firewall blocks inbound traffic by default.
- The server replies to the Router's IP, and the connection is not sent back to the host, since it is not part of a session.

To resolve the conflict, a port triggering entry must be defined, which allows inbound traffic on UDP port 3333, only after a network host generated traffic to UDP port 2222. This results in accepting the inbound traffic from the gaming server, and sending it back to the network host which originated the outgoing traffic to UDP port 2222.



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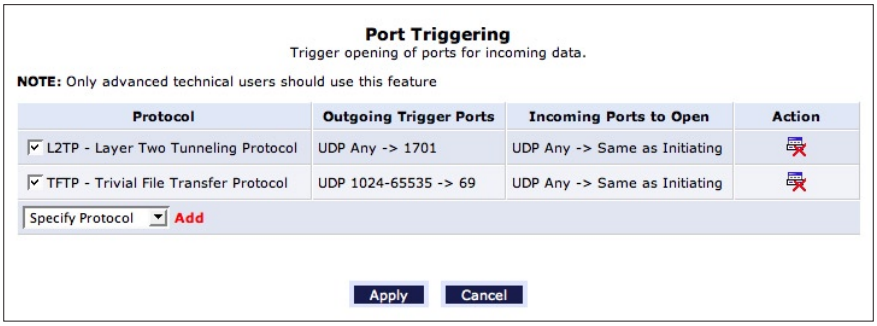
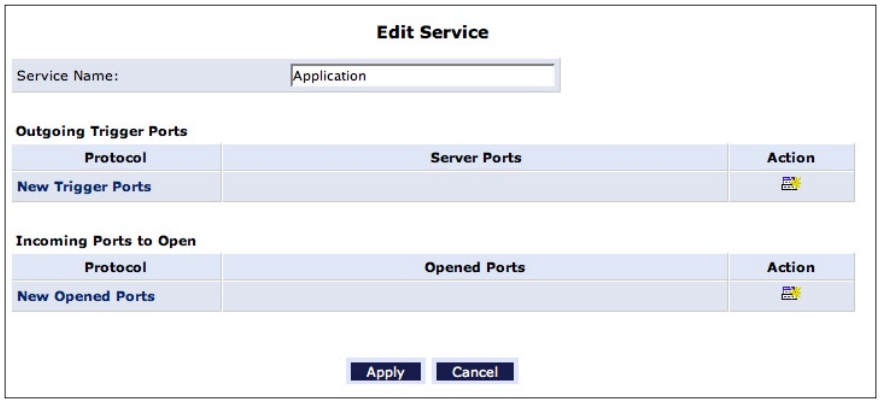
To use port triggering:

1. Select **Port Triggering** from the left side of any Security screen. The "Port Triggering" screen appears.




2. Select either "Specify Protocol" or "Show All Services" from the drop-down list next to "Add."

3. Click **Add**. An "Edit Service" screen appears.




4. Specify the port triggering entries by clicking **New Trigger Ports** and **New Opened Ports** and entering the protocol and protocol number in the succeeding screens. For example, to set up port triggering for the scenario laid out on the previous page, the service ports would be set to UDP and 2222, while the opened ports would be set to UDP and 3333.



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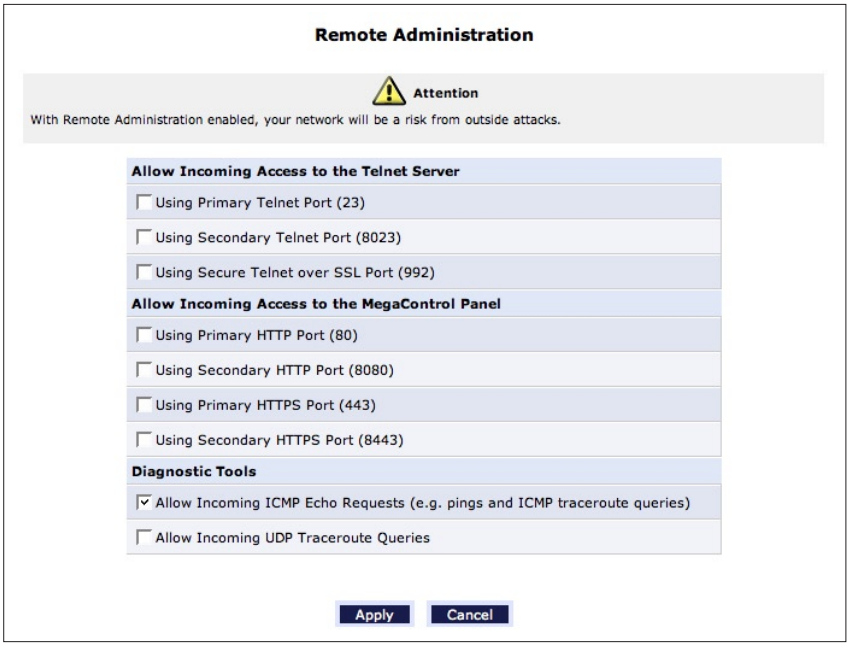
## Remote Administration

The Router can be accessed and controlled not only from within the local network, but also from the Internet using remote adminstration.

To access, select **Remote Administration** from the left side of any Security screen. The "Remote Administration" screen appears.


Remote Administration
Attention
With Remote Administration enabled, your network will be a risk from outside attacks.
Allow Incoming Access to the Telnet Server
Using Primary Telnet Port (23)
Using Secondary Telnet Port (8023)
Using Secure Telnet over SSL Port (992)
Allow Incoming Access to the MegaControl Panel
Using Primary HTTP Port (80)
Using Secondary HTTP Port (8080)
Using Primary HTTPS Port (443)
Using Secondary HTTPS Port (8443)
Diagnostic Tools
Allow Incoming ICMP Echo Requests (e.g. pings and ICMP traceroute queries)
Allow Incoming UDP Traceroute Queries
Apply
Cancel

### Telnet

Telnet is used to create a command-line session and gain access to all system settings and parameters using a text-based terminal. Select the Telnet port to be used by clicking in the appropriate check box, then click **Apply**.



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## MegaControl Panel

MegaControl Panel is used to obtain access to the Router's MegaControl Panel and gain access to all settings and parameters,using a web browser. Both secure (HTTPS) and non-secure (HTTP) access is available. Select the port to be used by clicking in the appropriate text box, then click **Apply**.

☞ ***Note:*** Telnet and MegaControl Panel remote administration access may be used to modify or disable firewall settings. Local IP addresses and other settings can also be changed, making it difficult or impossible to access the Router from the local network. Therefore, remote adminstration access to Telnet or MegaControl Panel services should be activated only when absolutely necessary.

## Diagnostic Tools

Diagnostic Tools are used for troubleshooting and remote system management by a user or the ISP.

☞ ***Note:*** Encrypted remote administration is performed using a secure SSL connection, and requires an SSL certificate. When accessing the Router for the first time using encrypted remote administration, a warning appears regarding certificate authentication because the Router's SSL certificate is self-generated. When encountering this message under these circumstances, ignore it and continue. Even though this message appears, the self-generated certificate is safe, and provides a secure SSL connection.



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## Website Blocking

The Router can be configured to block specific websites, preventing access to them from computers on the local network. Restrictions can also be applied to a comprehensive, automatically updated table of sites to which access is not recommended. To view the table of websites currently being blocked, select **Website Blocking** in any Security screen. To activate website blocking, click in the "Enable Website Blocking" check box.

Website Blocking
Block access to specific websites for specific computers or devices that are connected to the network.
Note: To activate the Website Blocking Feature, please ensure to check the box next to Enable Website Blocking
Enable Website Blocking
Networked Computer / Device
Network Address
Blocked Website
Status
Action
Add
Press the Refresh button to update the data.
Apply
Cancel
Resolve Now
Refresh

To add a new website to the table:

1. Click **Add**. The "Blocked Website" screen appears.

2. Enter the website's address (IP or URL). All pages within the website will also be blocked. If the website address has multiple IP addresses, the Router will resolve all additional addresses and automatically add them to the restrictions table.

3. To apply website blocking to a single computer or group of computers on the network, select them from the "Networked Computer/Device" drop-down list.



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4. If website blocking needs to be active all the time, select **Always** from the "When should this rule occur?" drop-down list. If the rule will only be active at certain times, select **Specify Schedule** and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the "Advanced Settings" chapter of this manual).

   ☞ ***Note:*** Make sure the Router's date and time are set correctly for the local time zone.

5. Click **Apply** to add the website to the table. The previous screen appears while the Router attempts to find the site. "Resolving..." appears in the "Status" column while the website is being located.

6. If the site is successfully located, "Resolved" appears in the Status column. If not, "Hostname Resolution Failed" appears. Click **Refresh** to update the status, if necessary. If the Router fails to locate the website, do the following:

   - Use a web browser to verify the website is available. If it is, the website address was entered incorrectly. See "Modifying a Website Address," below.
   - If the website is not available, return to the Website Blocking screen at a later time and click **Resolve Now** to verify the website can be found and is blocked by the Router.

### Modifying a Website Address

To modify a website address currently in the table:

1. Click the appropriate icon in the "Action" column. The "Blocked Website" screen appears.

2. Modify the website address, group, and schedule as necessary. Omit the "http://" at the beginning and the "/" at the end of the address.

3. Click **Apply** to save changes.



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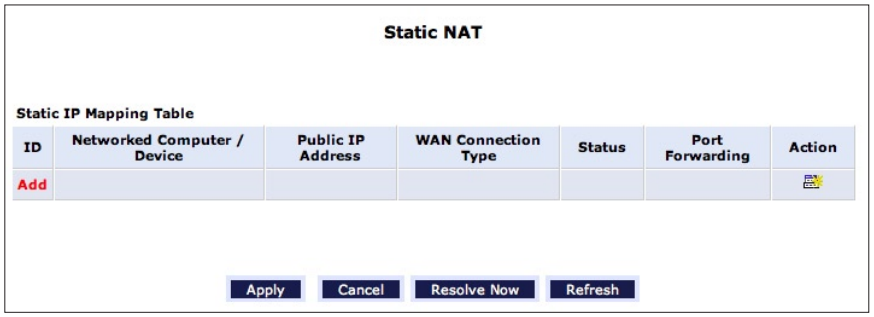
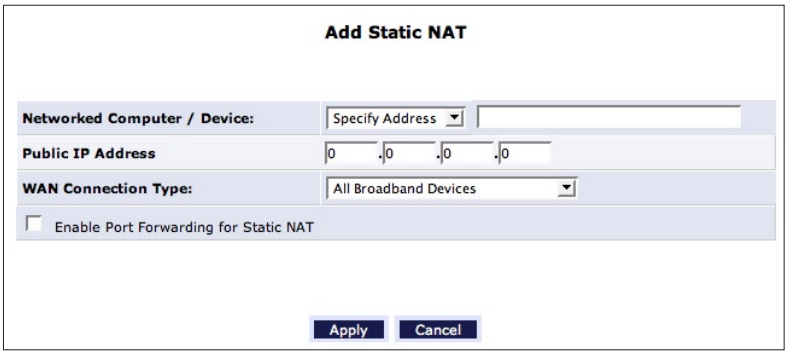
## Static NAT

This option allows multiple public addresses to be designated to devices on the network. Static NAT allows devices behind a firewall and configured with private IP addresses appear to have public IP addresses on the Internet. This allows an internal host, such as a web server, to have an unregistered (private) IP address and still be reachable over the Internet. To do this:

1. Select **Static NAT** from any Security screen. The "Static NAT" screen appears.




2. Click **Add**. The "Add Static NAT" screen appears.




3. Enter the name of the computer to be used as the local host, or, to enter a specific IP address, select **Specify Address** from the "Networked Computer/ Device" drop-down list and enter the IP address in the box on the right.

4. Enter a public IP address assigned by the ISP in the "Public IP Address" text box.

5. Select a connection from the "WAN Connection Type" drop-down list.

6. Select the protocol that needs to be accessible from the public IP address by clicking in the check box next to "Enable Port Forwarding for Static NAT," then selecting a protocol from the drop-down menu. Use "Any" to pass all data. Click **Apply**, and **Apply** again.

Repeat these steps to add more static IP addresses from the network.



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## Advanced Filtering

Advanced filtering is designed to allow comprehensive control over the firewall's behavior. Specific input and output rules can be defined, the order of logically similar sets of rules controlled, and distinctions made between rules that apply to Internet and local network devices.

To access, select **Advanced Filtering** from any Security screen. The "Advanced Filtering" screen appears.

**Advanced Filtering**

**NOTE:** Only advanced technical users should use this feature.

**Input Rule Sets:** Manage all incoming traffic from the Internet

| Rule ID | Source Address | Destination Address | Protocols | Operation | Status | Action |
|---|---|---|---|---|---|---|
| Initial Rules | | | | | | Add |
| Network (Home/Office) Rules | | | | | | |
| 0 | Any | 192.168.1.1 | Any | Drop | Active | |
| Add | | | | | | |
| Broadband Connection (Ethernet) Rules | | | | | | |
| 0 | Any | 224.0.0.0 / 240.0.0.0 | Any | Drop | Active | |
| Add | | | | | | |
| Ethernet Rules | | | | | | Add |
| Broadband Connection (Coax) Rules | | | | | | |
| 0 | Any | 224.0.0.0 / 240.0.0.0 | Any | Drop | Active | |
| Add | | | | | | |
| Coax Rules | | | | | | Add |
| Wireless Access Point Rules | | | | | | Add |
| WAN PPPOE Rules | | | | | | Add |
| WAN PPPOE 2 Rules | | | | | | Add |
| Final Rules | | | | | | Add |

**Output Rule Sets:** Manage all outbound traffic to the Internet

| Rule ID | Source Address | Destination Address | Protocols | Operation | Status | Action |
|---|---|---|---|---|---|---|
| Initial Rules | | | | | | Add |
| Network (Home/Office) Rules | | | | | | Add |
| Broadband Connection Rules | | | | | | Add |
| Ethernet Rules | | | | | | Add |
| Broadband Connection (Ethernet) Rules | | | | | | Add |
| Coax Rules | | | | | | Add |
| Wireless Access Point Rules | | | | | | Add |
| WAN PPPOE Rules | | | | | | Add |
| WAN PPPOE 2 Rules | | | | | | Add |
| Final Rules | | | | | | Add |

Apply Cancel Resolve Now Refresh

Two sets of rules can be configured: input rules and output rules. Each set of rules comprises three subsets: initial rules, network devices rules, and final rules. These subsets determine the sequence by which the rules will be applied. Following is a description of the set ordering for inbound and outbound packets.



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### Inbound Packets - Input Rule Sets

- Initial rules
- All rules defined for the network device on which the packet is
- Local servers rules from the local server tab in the security screen
- Rules to accept all the packets on a device in case the firewall check box "Internet Connection Firewall" in the connection settings screen is unchecked
- Remote administration rules from the remote administration tab
- DMZ host rules from the DMZ tab
- Final rules

### Outbound Packets - Output Rules Sets

- Initial rules
- All rules defined for the network device on which the packet is
- Rules to accept all the packets on a device in case the firewall check box "Internet Connection Firewall" in the connection settings screen is unchecked
- IP/hostname filtering rules and access control rules from the tabs in the security screen
- Final rules

There are numerous rules automatically inserted by the firewall in order to provide improved security and block harmful attacks.



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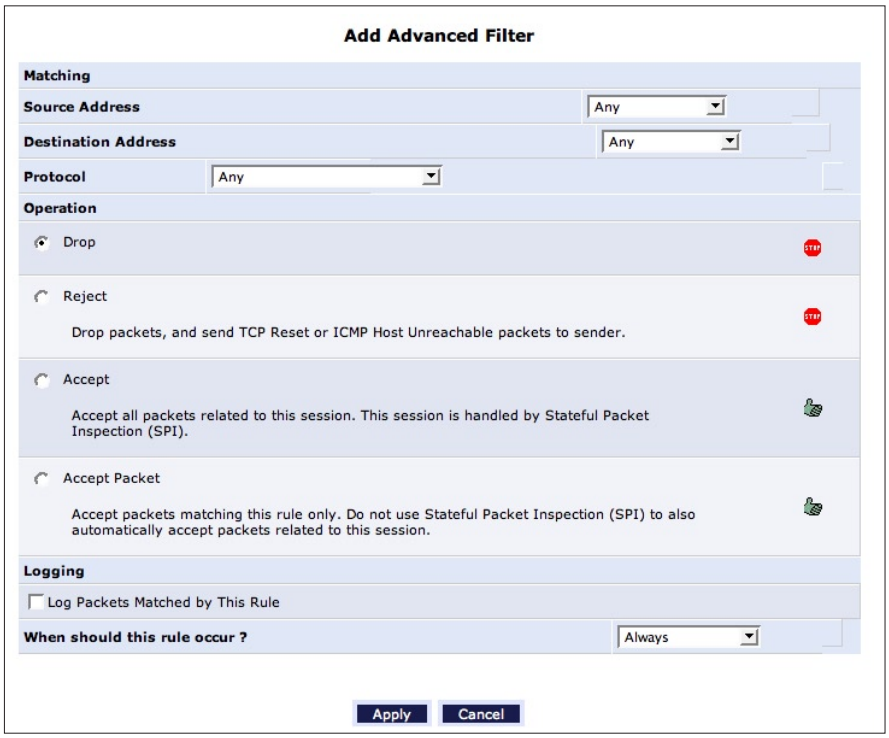
To configure advanced filtering rules, click **Add** next to the rule title. The "Add Advanced Filter" screen appears.




To add an advanced filtering rule, define the following rule parameters:

## Matching

To apply a firewall rule, a match must be made between IP addresses or ranges and ports. Use the "Source Address" and "Destination Address" drop-down lists to define the coupling of source and destination traffic. Port matching will be defined when selecting protocols. For example, if the FTP protocol is selected, port 21 will be checked for matching traffic flow between the defined source and destination IPs.

## Operation

This is where the action the rule will take is defined. Select one of the following radio buttons:

- **Drop** - Deny access to packets that match the source and destination IP addresses and protocol ports defined in "Matching."
- **Reject** - Deny access to packets that match the source and destination IP addresses and protocol ports defined in upper section of the screen, and send an ICMP error or a TCP reset to the origination peer.



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- **Accept** - Allow access to packets that match the source and destination IP addresses and protocol ports defined in upper section of the screen. The data transfer session will be handled using Stateful Packet Inspection (SPI).
- **Accept Packet** - Allow access to packets that match the source and destination IP addresses and protocol ports defined in upper section of the screen. The data transfer session will not be handled using Stateful Packet Inspection (SPI), so other packets that match this rule will not be automatically allowed access. This setting is useful when creating rules that allow broadcasting.

### Logging

Click in this check box to add entries relating to this rule to the security log.

### Scheduler (When should this rule occur?)

If advanced filtering needs to be active all the time, select "Always" from the "When should this rule occur?" drop-down list. If the rule will only be active at certain times select **Specify Schedule** and click **Add**. Then, add a schedule rule (for more details about schedule rules, see the "Advanced Settings" chapter of this manual)

## Security Log

The security log displays a list of firewall-related events, including attempts to establish inbound and outbound connections, attempts to authenticate at an administrative interface (MegaControl Panel or Telnet terminal), firewall configuration, and system start-up.

To access the security log, select **Security Log** from any Security screen. The "Security Log" screen appears.

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### Time

The time (based on the Router's date and time settings) the event occurred.

### Event

There are five kinds of events listed in the system log:

- **Inbound Traffic** - a result of an incoming packet
- **Outbound Traffic** - a result of an outgoing packet.
- **Firewall Setup** - configuration message
- **WBM Login** - a user logged in to WBM
- **CLI Login** - a user logged in to the command line interface via Telnet

### Event-Type

Displays a textual description of the event.

### Details

The "Details" column displays more information about the packet or the event, such as protocol, IP addresses, ports, etc. The following are the available event types that can be recorded in the security log:

- **Firewall internal** - from the firewall internal mechanism, in case this event-type is recorded, an accompanying explanation will be added.
- **Firewall status changed** - the firewall changed status from up to down or the vice versa, as specified in the event type description.
- **STP packet** - an STP (Spanning Tree Protocol) packet has been accepted/rejected.
- **Illegal packet options** - the options field in the packet's header is either illegal or forbidden.
- **Fragmented packet** - a fragment has been rejected.
- **WinNuke protection** - a WinNuke attack has been blocked.



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- **ICMP replay** - an ICMP (Internet Control Message Protocol) replay message has been blocked.
- **ICMP redirect protection** - an ICMP redirected message has been blocked.
- **Packet invalid in connection** - an invalid connection packet has been blocked.
- **ICMP protection** - a broadcast ICMP message has been blocked.
- **Broadcast/Multicast protection** - a packet with a broadcast/multicast source IP has been blocked.
- **Spoofing protection** - a packet from the Internet with a source IP belonging the local network has been blocked.
- **DMZ network packet** - a packet from a demilitarized zone network has been blocked.
- **Trusted device** - a packet from a trusted device has been accepted.
- **Default policy** - a packet has been accepted/blocked according to the default policy.
- **Remote administration** - a packet designated for the Router management has been accepted/blocked.
- **Access control** - a packet has been accepted/blocked because of an access control rule.
- **Parental control** - a packet has been blocked because of parental control.
- **NAT out failed** - NAT failed for this packet.
- **DHCP request** - the Router sent a DHCP request (depends on the distribution)
- **DHCP response** - the Router received a DHCP response (depends on the distribution)
- **DHCP relay agent** - a DHCP relay packet has been received (depends on the distribution)
- **IGMP packet** - an IGMP packet has been accepted.
- **Multicast IGMP connection** - a multicast packet has been accepted.



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- **PPTP connection** - a packet inquiring whether the Router is ready to receive a PPTP connection has been accepted.
- **AUTH:113 request** - an outbound packet for AUTH protocol has been accepted (for maximum security level).
- **IPV6 over IPV4** - an IPv6 over IPv4 packet has been accepted.
- **ARP** - an ARP packet has been accepted.
- **PPP Discover** - a PPP discover packet has been accepted.
- **PPP Session** - a PPP session packet has been accepted.
- **802.1Q** - a 802.1Q (VLAN) packet has been accepted.
- **Outbound Auth1X** - an outbound Auth1X packet has been accepted.
- **IP Version 6** - an IPv6 packet has been accepted.
- **Router initiated traffic** - all traffic the Router initiates is recorded.
- **Maximum security enabled service** - a packet has been accepted because it belongs to a permitted service in the maximum security level.
- **SynCookies Protection** - a SynCookies packet has been blocked.
- **ICMP Flood Protection** - a packet has been blocked, stopping an ICMP flood.
- **UDP Flood Protection** - a packet has been blocked, stopping a UDP flood.
- **Service** - a packet has been accepted because of a certain service, as specified in the event type.
- **Advanced Filter Rule** - a packet has been accepted/blocked because of an advanced filter rule.
- **Fragmented packet, header too small** - a packet has been blocked because, after defragmentation, the header was too small.
- **Fragmented packet, header too big** - a packet has been blocked because, after defragmentation, the header was too big.
- **Fragmented packet, bad align** - a packet has been blocked because, after defragmentation, the packet was badly aligned.



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- **Fragmented packet, packet too big** - a packet has been blocked because, after defragmentation, the packet was too big.
- **Fragmented packet, packet exceeds** - a packet has been blocked because, after defragmentation, the packet exceeded.
- **Fragmented packet, no memory** - a fragmented packet has been blocked because there is no memory for fragments.
- **Fragmented packet, overlapped** - a packet has been blocked because, after defragmentation, there were overlapping fragments.
- **Defragmentation failed** - the fragment has been stored in memory and blocked until all fragments have arrived and defragmentation can be performed.
- **Connection opened** - debug message regarding connection.
- **Wildcard connection opened** - debug message regarding connection.
- **Wildcard connection hooked** - debug message regarding connection.
- **Connection closed** - debug message regarding connection.
- **Echo/Chargen/Quote/Snork protection** - a packet has been blocked due to Echo/Chargen/Quote/Snork protection.
- **First packet in connection is not a SYN packet** - a packet has been blocked due to a TCP connection that started without a SYN packet.
- **Error : No memory** - a new connection has not been established because of lack of memory.
- **NAT Error : connection pool is full. No connection created** -a connection has not been created because the connection pool is full.
- **NAT Error: No free NAT IP** - no free NAT IP, so NAT has failed.
- **NAT Error: Conflict Mapping already exists** - a conflict occurred because the NAT mapping already exists, so NAT failed.
- **Malformed packet: Failed parsing** - a packet has been blocked because it is malformed.
- **Passive attack on ftp-server: Client attempted to open Server ports** - a packet has been blocked.



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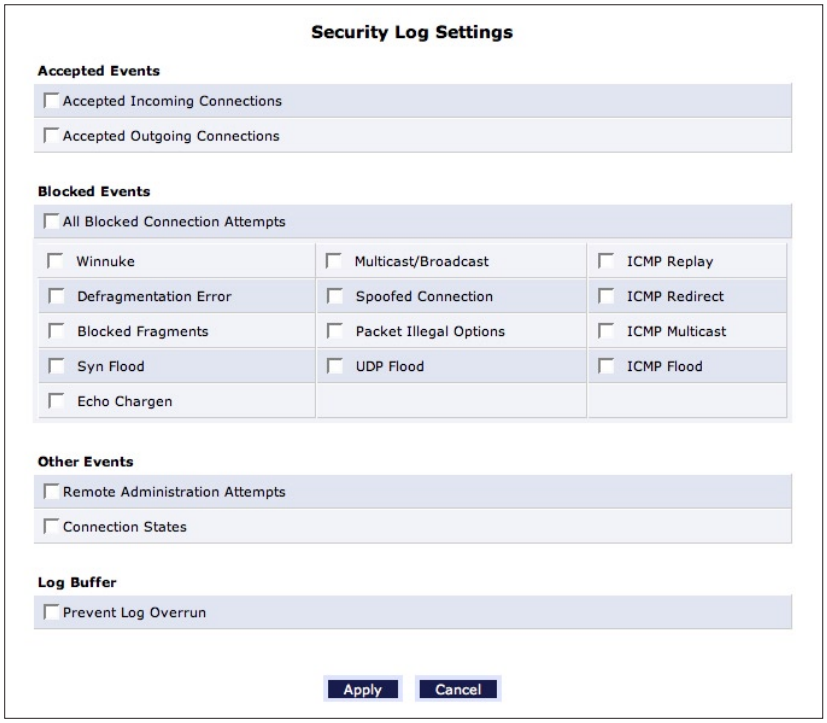
- **FTP port request to 3rd party is forbidden (Possible bounce attack)** - a packet has been blocked.
- **Firewall Rules were changed** - the firewall rule set has been modified.
- **User authentication** - a message arrived during login time, including both successful and failed authentication.

## Security Log Settings

To view or change the security log settings:

1. Click **Settings** in the Security Log screen. The "Security Log Settings" screen appears.




2. Select the type of activities that will generate a log message:
   - **Accepted Incoming Connections** - activating this check box generates a log message for each successful attempt to establish an inbound connection to the local network.
   - **Accepted Outgoing Connections** - activating this check box generates a log message for each successful attempt to establish an outgoing connection to the public network.



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3. Select the type of blocked events to be listed in the log:

   - **All Blocked Connection Attempts** - activating this check box generates log messages for all blocked events.
   - **Other Blocked Events** - if "All Blocked Connection Attempts" is unchecked, select specific blocked events from this list to generate log messages.

4. Click in the "Remote Administration Attempts" check box to write a log message for each remote-administration connection attempt, whether successful or not.

5. Click in the "Connection States" check box to track connection handling by the firewall and Application Level Gateways (ALGs).

6. Click **Apply** to save changes.



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# Using Parental Controls

# 7

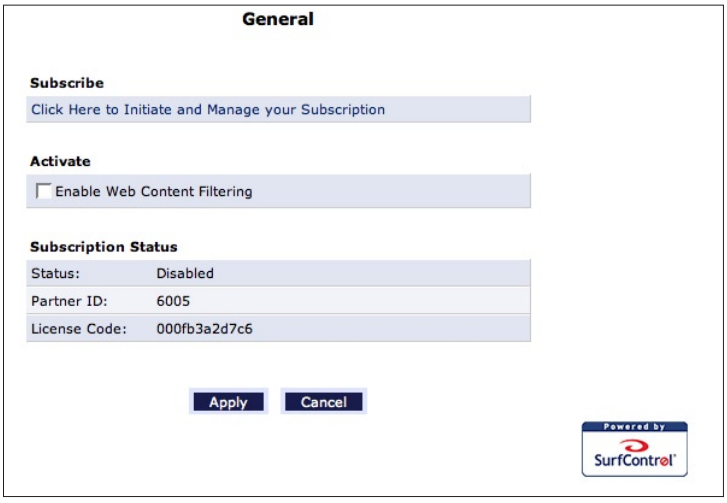
The abundance of harmful information on the Internet poses a serious challenge for employers and parents alike - "How can I regulate what my employee/child does on the Internet?" The Wireless Broadband Router's Parental Controls allows users to regulate, control, and monitor Internet access. By classifying and categorizing online content, it is possible to create numerous Internet access policies and easily apply them to networked computers.

## Activating Parental Controls

The Router's Parental Control service is provided by Surf Control (http://www.surfcontrol.com/), a company specializing in Internet content filtering. A subscription to this service must be activated to use the Router's Parental Controls. To subscribe through the Router's MegaControl Panel:

1. Click **Parental Controls** from the top of the Home screen.

2. If no subscription has been activated, or the subscription has expired, the "General" screen appears.




3. If the "Enable Web Content Filtering" check box in the "Activate" section is not checked, click in the check box to activate.

4. Click **Click Here to Initiate and Manage your Subscription** in the "Subscribe" section.



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5. The Surf Control subscription site will then be displayed in a new browser window. Follow the instructions on the website and subscribe or enroll for a free trial. A verification E-mail will be sent. Click on the link in the verification E-mail. About 20 seconds after clicking on the verification link, the subscription will be activated.

6. Return to the MegaControl Panel and click **Parental Control**. The "Filtering Policy" screen appears, with a subscription expiration date at the top. If not, select the "Advanced Options" tab, then **Refresh Servers**. Wait a few seconds and repeat this step.

### Disabling Web Content Filtering

To disable the Router's Web content filtering:

1. From the MegaControl Panel, click **Parental Control**.

2. Clear the "Enable Web Content Filtering" check box.

3. Click **Apply**.

## Creating a Filtering Policy

A filtering policy defines what sites will be blocked, based on their category. The Router provides four built-in policies:

- **Block All** - blocks all access to the Internet
- **Allow All** - allows unlimited Internet access
- **Home** - blocks sites under the "Child Protection" category
- **Employee** - blocks sites from non work-related categories

These policies can be set from the "Default Filtering Policy" drop-down list in the "Filtering Policy" screen. To view or edit the "Home" and "Employee" policies, click their respective links in the Filtering Policy screen.

Custom filtering policies can also be created. To do so:

1. From the MegaControl Panel, click **Parental Control**.



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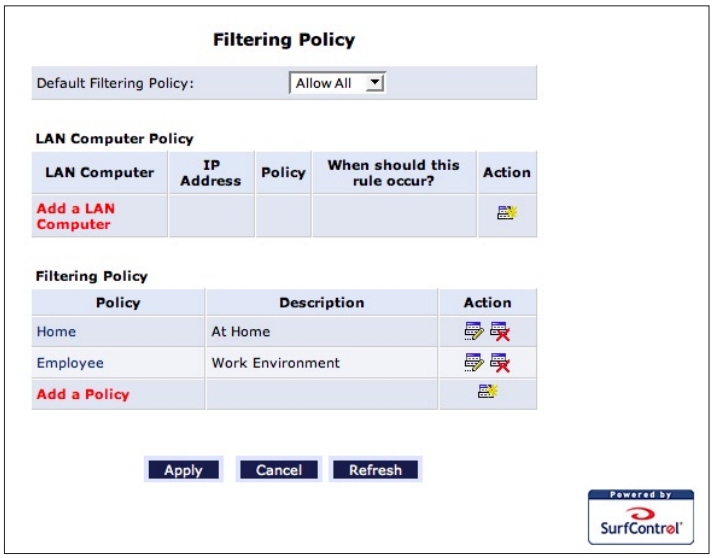
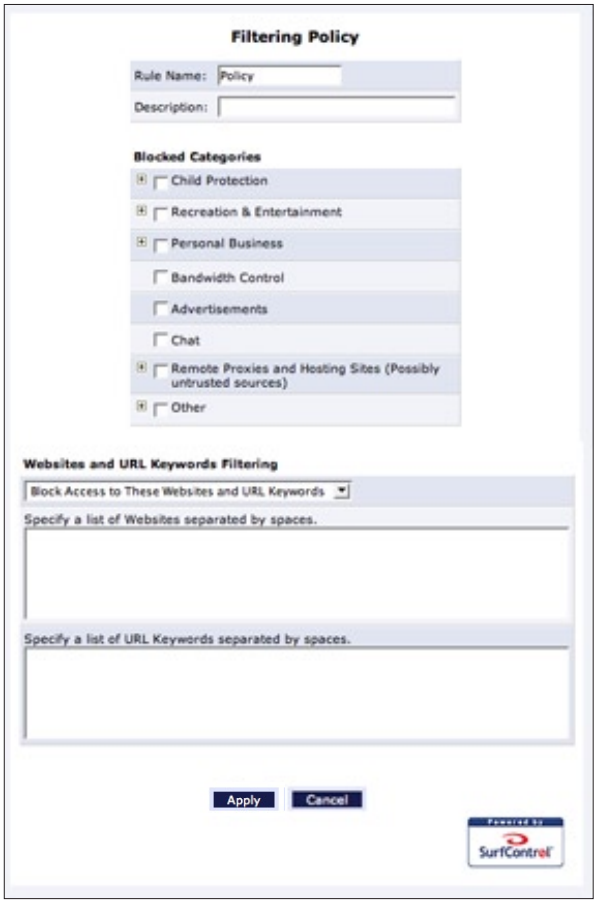
2. Click **Filtering Policy** from the list on the left side of the screen. The "Filtering Policy" screen appears.




3. Click **Add a Policy** to generate another "Filtering Policy" screen.




4. Enter a name for the new policy in the "Name" text box.



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5. Enter a description of the new policy in the "Description" text box.

6. Select the content filtering check boxes that represent content to be blocked in the "Blocked Categories" section.

7. Click **Apply** to save the new policy.

Selecting a category will automatically select all its sub-categories and deselecting a category will automatically deselect its sub-categories. To make a more refined selection of filtering options, click on the "+" next to each category to display a list of its sub-categories. A click on the resulting "-" will revert the category to its previous display. Clicking the "-" of a category will only be possible if all its sub-categories are either checked or unchecked.

## Websites and URL Filtering

Additional filtering (by website URL or URL keyword) can be done using the "Websites and URL Filtering" section of the Policy Filtering screen. To do this:

1. Select either **Block Access to These Websites and URL Keywords** or **Allow Access to These Websites and URL Keywords** from the drop-down list.

2. In the "Specify a list of Websites separated by spaces" text box, enter the URLs of the websites to be blocked or accessed. Separate each discrete URL with a space.

3. In the "Specify a list of URL Keywords separated by spaces" text box, enter the URL keywords to be blocked or accessed.

4. Click **Apply** to save. If "Block Access to These Websites and URL Keywords" was chosen in step 1, all websites listed and all other websites with the keywords listed in their URLs will be blocked. If "Allow Access to These Websites and URL Keywords" was chosen in step 1, only the websites listed and other websites with the keywords listed in their URLs will be allowed to be accessed.

## Applying the Filtering Policy

Once different filtering policies have been created, either define a default policy that will be applied to all networked computers, or apply different policies to individual computers separately.



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## LAN Filtering Policy

To select a default filtering policy for the local network, select the policy name from the "Default Policy" drop-down list, located in the Filtering Policy screen, and click **Apply**.

## PC Filtering Policy

To apply separate policies to individual home computers, do the following:

1. In the Filtering Policy screen, click **Add a LAN Computer**. The "LAN Computer Policy" screen appears.

2. Enter the name or IP address of the networked computer to which a policy will be applied.
3. Select the policy to apply from the "Policy" drop-down list.
4. If schedules have been defined, specify when this policy will be active by selecting the schedule to apply from the "Schedule" drop-down list. Otherwise, select **Specify Schedule**, click **Add**, then select the time frame.
5. Click **Apply**.
6. In the Filtering Policy screen, use the check-box next to the computer name to enable or disable the policy for a particular computer.
7. Click **Apply**.



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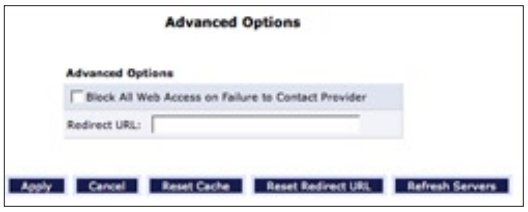
# Advanced Options

The "Advanced Options" screen contains features providing additional Web filtering security.




## Provider Consulting Failure

To decide whether to allow or block a specific website, the filter service provider is consulted about the website's category. If an error occurs consulting the provider, the user can decide whether to block or allow access to all sites.

1. Click **Parental Control** in the Home screen.
2. Click **Advanced Options** from the left side of the General screen.
3. Click in the "Block All Web Access on Failure to Contact Provider" check box to block access to all sites, in case the provider is not responding.
4. Click **Apply**.

## Redirect URL

When a site is blocked, the Router's "Blocked Access" page is displayed, specifying the requested URL and the reason it was blocked.

To specify an alternative page to be displayed when a site is blocked, enter the URL of the alternative page in the "Redirect URL" text box .



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## Statistics

The Router's MegaControl Panel monitors content filtering statistics. Statistics include a record of:

- Access attempts
- Accessed URLs
- Blocked URLs
- URLs that were accessed from cache

To view content filtering statistics:

1. Click **Parental Control** in the Home screen.
2. Click **Statistics** from the left side of the General screen. The "Statistics" screen appears.

☞ ***Note:*** When Parental Control is enabled, HTTP services cannot be blocked by the Security Access Control feature.



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# Using Advanced Settings

# 8

The "Advanced" section of the Wireless Broadband Router's MegaControl Panel is intended primarily for more advanced users. Some changes to settings within this section could adversely affect the operation of the Router and the local network, and should be made with caution.

To access the Router's Advanced Settings, click **Advanced** at the top of the Home screen, which generates the "Advanced" screen.

The following settings are explained in this chapter:

**Firmware Upgrade** - download and install new versions of the Router's firmware

**Firmware Restore** - restores firmware to previous version loaded in flash memory

**Configuration File** - manage configuration files

**System Settings** - modify the system's settings

**Date and Time** - set the local date and time

**Scheduler Rules** - schedule firewall activation

**Routing** - manage routing policies



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**IP Address Distribution** - manage the IP addresses of devices on the network

**Diagnostics** - perform diagnostic tests on the Router

**Restore Defaults** - reset the Router to its default settings

**Reboot Router** - restart the Router

**MAC Cloning** - clone MAC addresses

**ARP Table** - display active devices and their IP and MAC addresses, etc.

**Users** - create and manage remote users

**Local Administration** - configure and manage local administration policies

**Dynamic DNS** - configure Dynamic DNS settings

**DNS Server** - manage the local (LAN) network for host name and IP address

**Network Objects** - create and manage network objects (discrete LAN subsets)

**Universal Plug and Play** - configure Universal Plug and Play settings

**Protocols** - manage and create open ports for various Internet protocols or customize an application

**About** - view information about the Router

**Radius** - manage the RADIUS (Remote Authentication Dial-in User Service) server

**Remote Administration** is explained in the "Security" chapter of this manual.
**QoS** is explained in Appendix A of this manual.



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## Firmware Upgrade

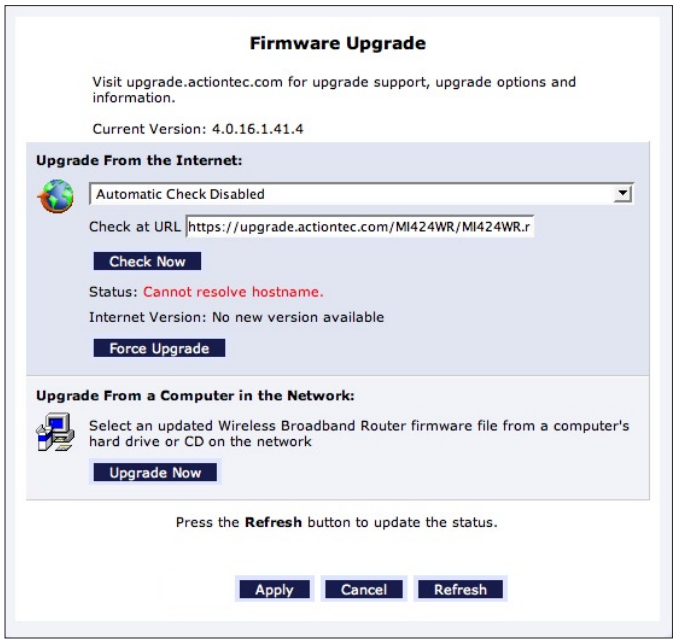
The Router offers a built-in mechanism for upgrading its firmware without losing custom configurations and settings. There are two methods for upgrading the firmware:

- **Upgrading from a local computer** - use a software image file pre-downloaded to the computer's disk drive or located on the accompanying evaluation CD.
- **Upgrading from the Internet** - use this method to upgrade the Router's firmware by remotely downloading an updated software image file.

### Upgrading From a Local Computer

To upgrade from a local computer:

1. Click **Firmware Upgrade** from the Advanced screen. The "Firmware Upgrade" screen appears.


Firmware Upgrade
Visit upgrade.actiontec.com for upgrade support, upgrade options and information.
Current Version: 4.0.16.1.41.4
Upgrade From the Internet:
Automatic Check Disabled
Check at URL https://upgrade.actiontec.com/MI424WR/MI424WR.r
Check Now
Status: Cannot resolve hostname.
Internet Version: No new version available
Force Upgrade
Upgrade From a Computer in the Network:
Select an updated Wireless Broadband Router firmware file from a computer's hard drive or CD on the network
Upgrade Now
Press the Refresh button to update the status.
Apply
Cancel
Refresh



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2. In the "Upgrade From a Computer in the Network" section, click **Upgrade Now**. The "Upgrade From a Computer in the Network" screen appears.

Upgrade From a Computer in the Network
Browse to locate the file, then press OK to begin the firmware upgrade process.
Browse...
Apply
Cancel

3. Enter the path of the software image file, or press the "Browse" button to browse for the file, and click **Apply**. Make sure to only use files with an "rmt" extension when performing the firmware upgrade procedure.

4. When loading is completed, a confirmation screen appears, asking whether to upgrade to the new version. Click **Apply**. The upgrade process begins and should take no longer than one minute to complete.

At the conclusion of the upgrade process the Router automatically reboots. The new firmware will run, maintaining any custom configurations and settings.

## Upgrading From the Internet

The Router's firmware can be automatically updated via the Internet. From the drop-down list next to the globe icon near the top of the Firmware Upgrade screen, a list of options appears, as described below.

### *Automatically Check and Upgrade*

If "Automatically Check for New Version and Upgrade Wireless Broadband Router" is selected, enter the period of time the Router checks for a new upgrade, and the URL at which to get the upgrade, in the appropriate text boxes. The Router will then check at each time interval for upgrades and, if one is available, upgrade the Router's firmware.

### *Automatically Check and Send E-mail*

If "Automatically Check for New Version and Notify via Email" is selected, enter the period of time the Router checks for a new upgrade, and the URL at which to get the upgrade, in the appropriate text boxes. The Router will then check at each time interval for firmware upgrades and, if one is available, send an E-mail to the E-mail address listed in the System Settings.



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### *Automatic Check Disabled*

If "Automatically Check Disabled" is selected, the Router will not automatically check for firmware upgrades.

### *Manual Checking and Upgrading*

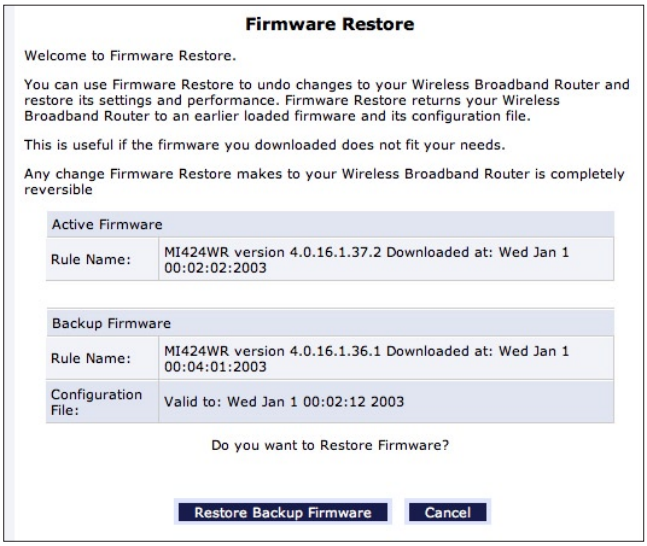
To manually upgrade the Router's firmware:

1. Click **Check Now** in the Firmware Upgrade screen.
2. If a new version is available, click **Force Upgrade**. A download process will begin. When downloading is completed, a confirmation screen appears, asking whether to upgrade to the new version.
3. Click **Apply**. The upgrade process will begin and should take no longer than one minute to complete.

At the conclusion of the upgrade process the Router automatically reboots. The new firmware runs, maintaining any custom configurations and settings.

## Firmware Restore

Firmware restore allows the Router's firmware to return to an earlier version, if the current version is unstable or does not meet specified needs. Click **Firmware Restore** from the Advanced screen to generate the "Firmware Restore" screen.


Firmware Restore
Welcome to Firmware Restore.
You can use Firmware Restore to undo changes to your Wireless Broadband Router and restore its settings and performance. Firmware Restore returns your Wireless Broadband Router to an earlier loaded firmware and its configuration file.
This is useful if the firmware you downloaded does not fit your needs.
Any change Firmware Restore makes to your Wireless Broadband Router is completely reversible
Active Firmware
Rule Name:
MI424WR version 4.0.16.1.37.2 Downloaded at: Wed Jan 1 00:02:02:2003
Backup Firmware
Rule Name:
MI424WR version 4.0.16.1.36.1 Downloaded at: Wed Jan 1 00:04:01:2003
Configuration File:
Valid to: Wed Jan 1 00:02:12 2003
Do you want to Restore Firmware?
Restore Backup Firmware
Cancel

The screen displays the "Active Firmware" and the "Backup Firmware." To restore the firmware to the backup firmware, click **Restore Backup Firmware**. A confirmation screen appears. Click **OK** to finish restoring the Router's firmware.



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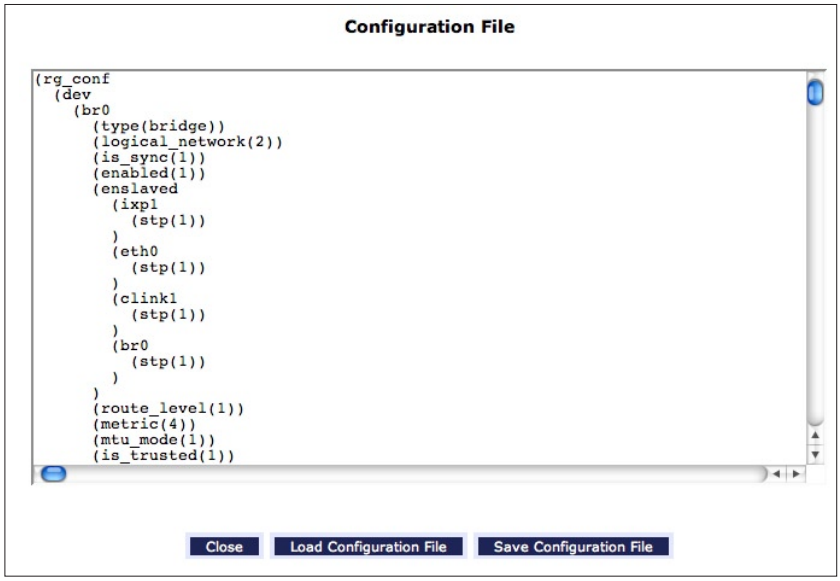
## Configuration File

Use the Router's Configuration File feature to view, save, and load configuration files, which are used to backup and restore the Router's current configuration: To do this:

1. Click **Configuration File** in the Advanced screen. The "Configuration File" screen appears.




2. Click **Load Configuration File** at the bottom of the screen to load the previous configuration from a file and restart the Router.

3. Click **Save Configuration File** at the bottom of the screen to backup the current configuration to a file.



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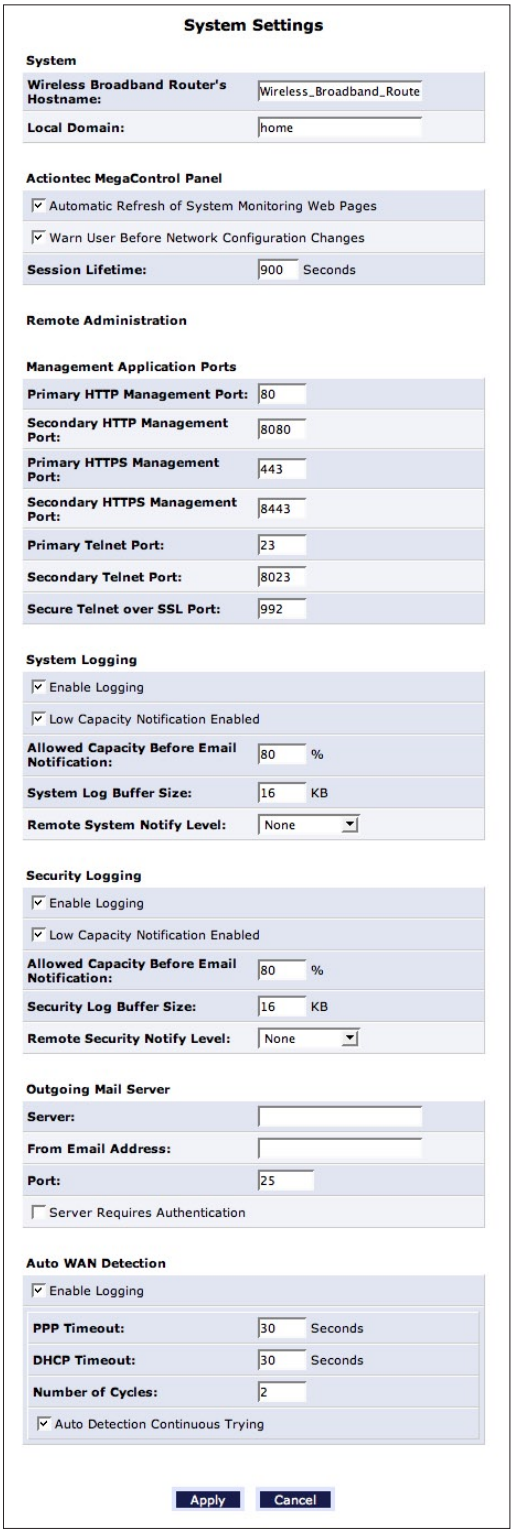
## System Settings

Clicking **System Settings** in the Advanced screen generates the "System Settings" screen, where various system and management parameters can be configured.



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## System

Use the "System" section of this screen to configure the following two options:

### *Wireless Broadband Router's Hostname*

Specify the Router's host name by entering it into the this text box. The host name is also the Router's URL address, so it can be entered here rather than 192.168.1.1.

### *Local Domain*

Specify the network's local domain by entering it into this text box.

## Actiontec MegaControl Panel

Use this section to configure the following:

### *Automatic Refresh of System Monitoring Web Pages*

Click in this check box to activate the automatic refresh of system monitoring web pages.

### *Prompt for Password When Accessing via LAN*

Click in this check box to force users who try to access the MegaControl Panel from the LAN (local area network) to enter the password.

### *Warn User Before Network Configuration Changes*

Click in this check box to activate user warnings before network configuration changes take effect.

### *Session Lifetime*

After the Router has been inactive for a period of time, the user must reenter a user name and password to continue accessing the MegaControl Panel. To change the length of this time period, enter the amount of time (in seconds) in the "Session Lifetime" text box.



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## Management Application Ports

This section allows the following management application ports to have their default port numbers to be changed:

- Primary/secondary HTTP ports
- Primary/secondary HTTPS ports
- Primary/secondary Telnet ports
- Secure Telnet over SSL ports

## System Logging

Use this section to configure the following system log options.

### *Enable Logging*

Click in this check box to activate system logging.

### *Low Capacity Notification Enabled*

Click in this check box to activate low capacity notification (works in tandem with "Allowed Capacity Before Email Notification" and "System Log Buffer Size" options).

### *Allowed Capacity Before Email Notification*

Enter the percentage of system log buffer capacity reached to trigger an E-mail notification.

### *System Log Buffer Size*

Enter the size of the system log buffer in this text box.

### *Remote System Notify Level*

This feature is used to specify the type of information received for remote system logging. Options include **None**, **Error**, **Warning**, and **Information**.



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## Security Logging

Use this section to configure the following security log options.

### *Enable Logging*

Click in this check box to activate security logging.

### *Low Capacity Notification Enabled*

Click in this check box to activate low capacity notification (works in tandem with "Allowed Capacity Before Email Notification" and "Security Log Buffer Size" options).

### *Allowed Capacity Before Email Notification*

Enter the percentage of security log buffer capacity reached to trigger an E-mail notification.

### *Security Log Buffer Size*

Enter the size of the security log buffer in this text box.

### *Remote System Notify Level*

This feature is used to specify the type of information received for security logging. Options include **None**, **Error**, **Warning**, and **Information**.

## Outgoing Mail Server

Use this section to configure the outgoing mail server options. This server is used format and send system and security log E-mail notifications.

### *Server*

Enter the host name of the outgoing (SMTP) server in this text box.

### *From Email Address*

E-mail notifications require a "from" address. Enter a "from" E-mail address in this text box.



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### *Port*

Enter the port number of the E-mail server in this text box.

### *Server Requires Authentication*

If the E-mail server requires authentication, click in this check box, then enter a user name and password in the "User Name" and "Password" text boxes that appear.

## Auto WAN Detection

When activated, Auto WAN Detection causes the Router to automatically search for a WAN connection.

### *Enable Logging*

Clicking in this check box activates automatic WAN detection.

### *PPP Timeout*

Enter the amount of time (in seconds) before the Router stops attempting to establish a broadband PPP connection.

### *DHCP Timeout*

Enter the amount of time (in seconds) before the Router stops attempting to establish a broadband DHCP connection.

### *Number of Cycles*

Enter the number of times the Router attempts to detect a broadband PPP and DHCP connection.

### *Auto Detection Continuous Trying*

Click in this check box to cause the Router to indefinitely search for a broadband connection.



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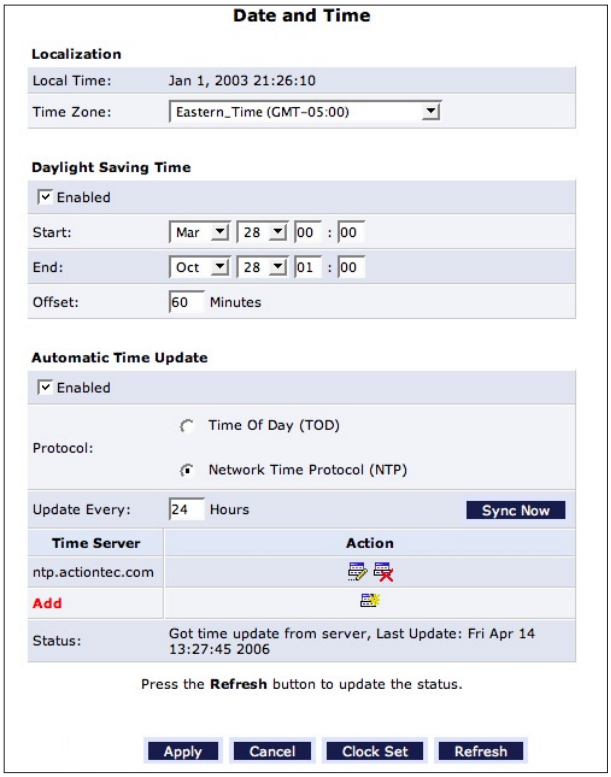
## Date and Time

To configure date, time, and daylight savings time settings perform the following:

1. Click **Date and Time** in the Advanced screen. The "Date and Time" screen appears.




2. Select the local time zone from the drop-down list. The Router can automatically detect daylight saving setting for selected time zones. If the daylight saving settings for a time zone are not automatically detected, the following fields will be displayed:

   - **Enabled** - Select this check box to enable daylight saving time.
   - **Start** - Date and time when daylight saving starts.
   - **End** - Date and time when daylight saving ends.
   - **Offset** - The time amount daylight saving time changes.



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To perform an automatic time update:

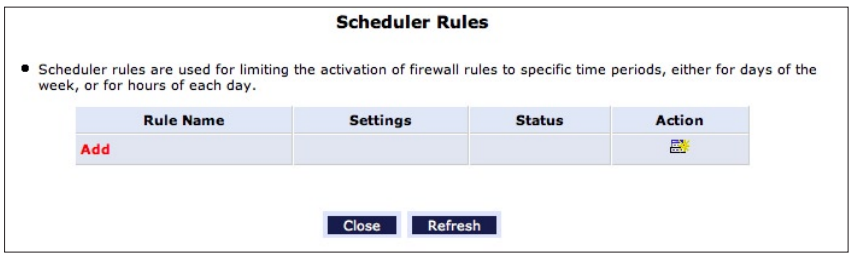
1. Click in the "Enabled" check box in the "Automatic Time Update" section.
2. Select the protocol to be used to perform the time update by selecting either the "Time of Day" or "Network Time Protocol" radio button.
3. Specify how often to perform the update in the "Update Every" text box.
4. Define time server addresses by clicking **Add** on the bottom of the "Automatic Time Update" section and entering the IP address or domain name of the time server in the "Time Server Settings" screen.

## Scheduler Rules

Scheduler rules are used for limiting the activation of firewall rules to specific time periods, either for days of the week, or for hours of each day.

To define a rule:

1. Make sure the Router's date and time are set correctly. To do this, see the "Date and Time" section in this chapter.
2. Click **Scheduler Rules** in the Advanced screen. The "Scheduler Rules" screen appears.


Scheduler Rules
Scheduler rules are used for limiting the activation of firewall rules to specific time periods, either for days of the week, or for hours of each day.
Rule Name
Settings
Status
Action
Add
Close
Refresh



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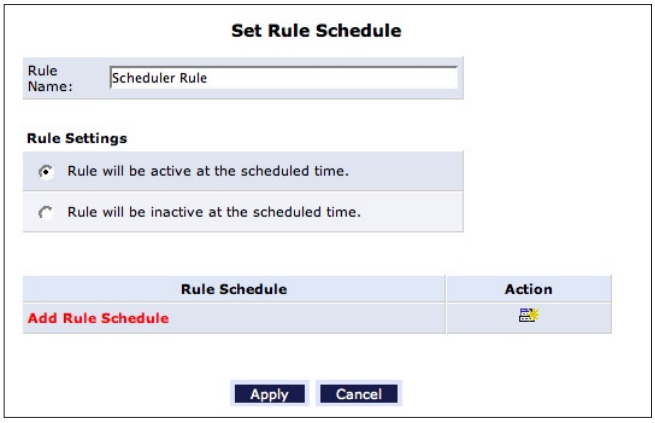
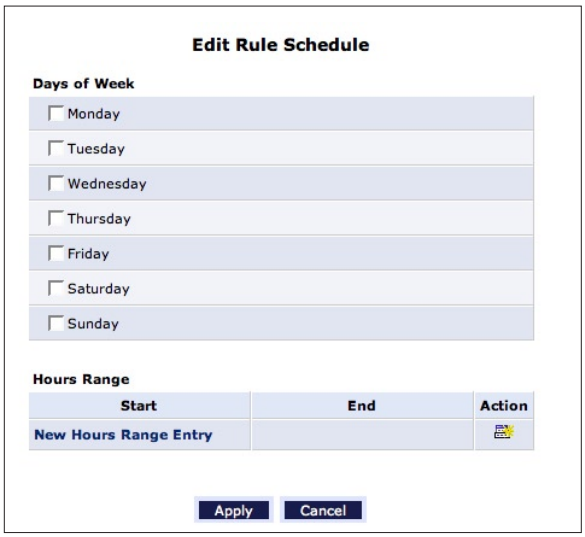
3. Click **Add**. The "Set Rule Schedule" screen appears.




4. Enter a name for the rule in the "Rule Name" text box.

5. Specify if the rule will be active or inactive during the designated time period by clicking the appropriate "Rule Settings" radio button.

6. Click **Add Rule Schedule**. The "Edit Rule Schedule" screen appears.




7. Select or active or inactive days of the week by clicking in the appropriate text boxes.



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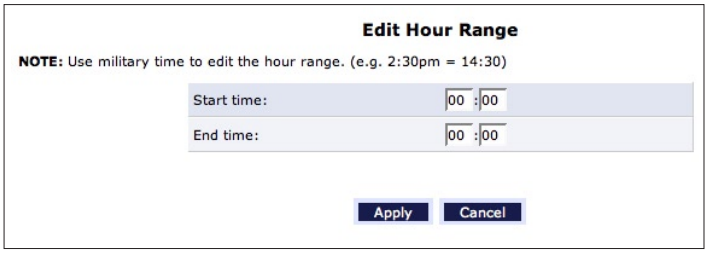
**8.** If applicable, click **New Hours Range Entry** to define an active/inactive hourly range. The "Edit Hour Range" screen appears. Enter a start and end time in the appropriate text boxes.

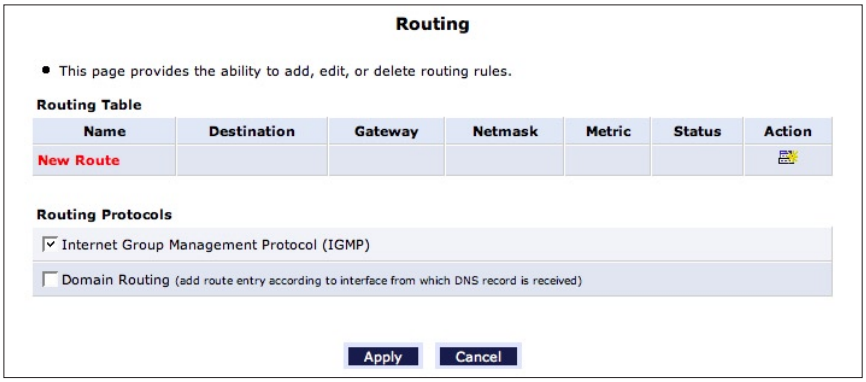



**9.** Click **Apply**.

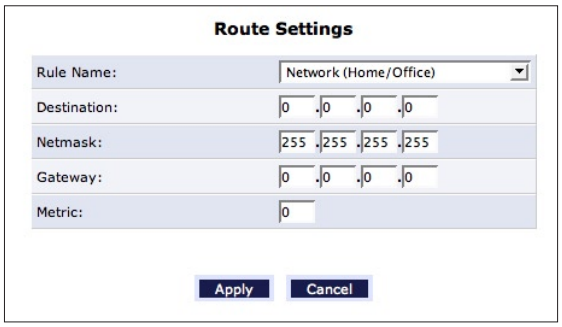
*Note:* Make sure the Router's date and time settings are properly configured for the time zone.

## Routing

Access the routing table rules by clicking **Routing** in the Advanced screen. The "Routing" screen appears.




Routing rules can be added, edited, or deleted from the Routing screen. To add a router, click **New Route**. The "Route Settings" screen appears.



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When adding a routing rule, the following parameters must be specified:

- **Rule Name**- Select the type of network from the drop-down list.
- **Destination** - The destination is the destination host, subnet address, network address, or default route. The destination for a default route is 0.0.0.0.
- **Netmask** - The network mask is used in conjunction with the destination to determine when a route is used.
- **Gateway** - Enter the Router's IP address.
- **Metric** - A measurement of the preference of a route. Typically, the lowest metric is the most preferred route. If multiple routes exist to a given destination network, the route with the lowest metric is used.

## IGMP Multicasting

The Router provides support for IGMP multicasting, which allows hosts connected to a network to be updated whenever an important change occurs in the network. A multicast is simply a message that is sent simultaneously to a pre-defined group of recipients. When joining a multicast group, all messages addressed to the group will be received by the user, much like when an E-mail message is sent to a mailing list.

IGMP multicasting enables UPnP capabilities over networks and may also be useful when connected to the Internet through the Router. When an application running on a computer in the network sends out a request to join a multicast group, the Router intercepts and processes the request. If the Router is set to "Minimum Security" no further action is required. However, if the Router is set to "Typical Security" or "Maximum Security," the group's IP address must be added to the Router's "Multicast Groups" screen. This will allow incoming messages addressed to the group to pass through the firewall and on to the correct networked computer.

1. Select **Routing** in the Advanced screen.
2. Activate the "Internet Group Management Protocol" check-box.
3. Click **Apply**.



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### Domain Routing

Domain routing is used in multi-router local network configurations. Normally, to accesss a device connected to one router from another router on the network, its IP address must be used. Activating domain routing (by clicking in the appropriate check box) allows the user to access to the computer by name (as well as IP address).

## IP Address Distribution

The Router's DHCP server makes it possible to easily add computers configured as DHCP clients to the network. It provides a mechanism for allocating IP addresses to these hosts and for delivering network configuration parameters to them.

For example, a client (host) sends out a broadcast message on the network requesting an IP address for itself. The DHCP server then checks its list of available addresses and leases a local IP address to the host for a specific period of time and simultaneously designates this IP address as "taken." At this point, the host is configured with an IP address for the duration of the lease.

The host can choose to renew an expiring lease or let it expire. If it chooses to renew a lease, it will also receive current information about network services, as it did with the original lease, allowing it to update its network configurations to reflect any changes that occurred since it first connected to the network. If the host wishes to terminate a lease before its expiration, it can send a release message to the DHCP server, which will then make the IP address available for use by others.

The Router's DHCP server:

- Displays a list of all DHCP hosts devices connected to the Router.
- Defines the range of IP addresses that can be allocated in the network.
- Defines the length of time for which dynamic IP addresses are allocated.
- Provides the above configurations for each network device and can be configured and enabled/disabled separately for each network device.
- Can assign a static lease to a network computer so that it receives the same IP address each time it connects to the network, even if this IP address is within the range of addresses that the DHCP server may assign to other computers.
- Provides the DNS server with the host name and IP address of each computer connected to the network.



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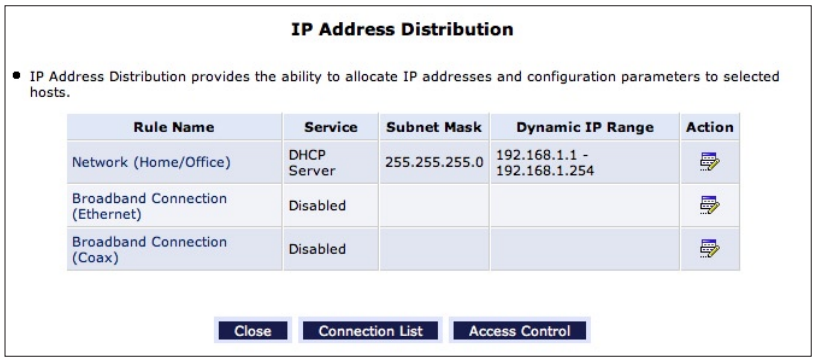
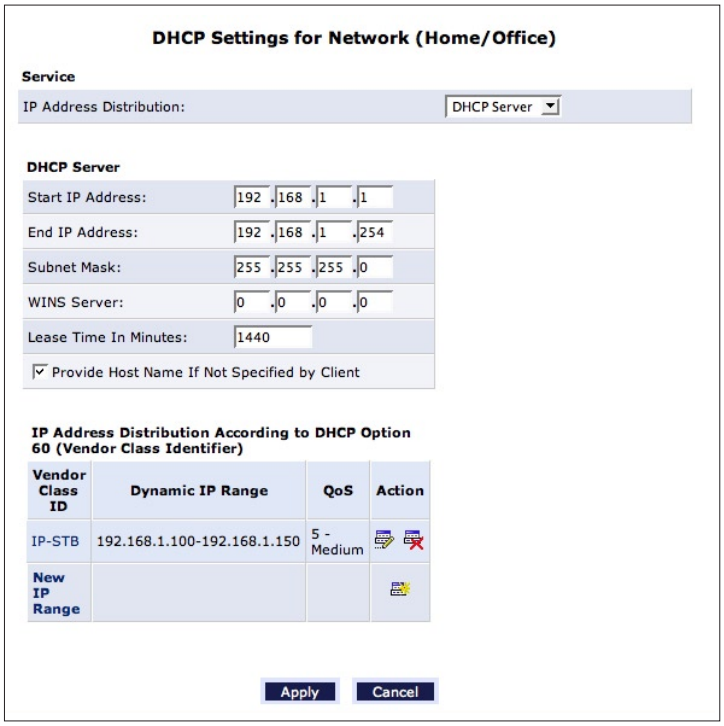
To view a summary of the services currently being provided by the DHCP server, click **IP Address Distribution** in the Advanced screen. The "IP Address Distribution" screen appears.




## Editing DHCP Server Settings

To edit the DHCP server settings for a device:

1. Click the appropriate icon in the "Action" column. The "DHCP Settings" screen for the device appears.




2. Select the "IP Address Distribution" from the drop-down list. Options include **DHCP Server**, **DHCP Relay**, or **Disable**.



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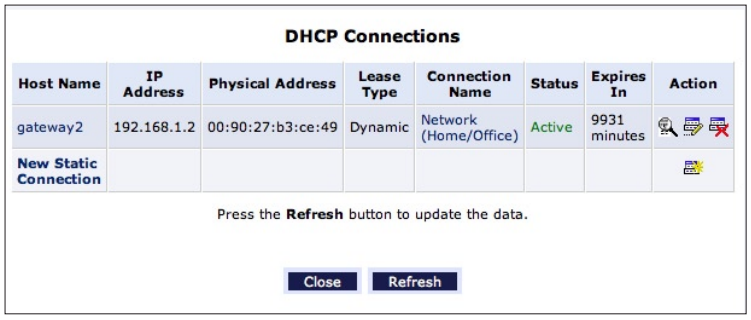
**3.** Complete the following fields:

- **Start IP Address Range, End IP Address Range** - determines the number of hosts connected to the network in this subnet. "Start" specifies the first IP address assigned in this subnet and "End" specifies the last IP address in the range.
- **Subnet Mask** - used to determine to which subnet an IP address belongs. An example of a subnet mask value is 255.255.0.0.
- **WINS Server** - The WINS (Windows Internet Naming Service) server determines the IP address associated with a network device.
- **Lease Time** - each device will be assigned an IP address by the DHCP server for a limited time ("Lease Time") when it connects to the network. When the lease expires, the server will determine if the computer has disconnected from the network. If it has, the server may reassign this IP address to a newly-connected computer. This feature ensures that IP addresses not in use will become available for other computers on the network.
- **Provide host name if not specified by client** - when activated, the Router assigns the client a default name if the DHCP client does not have a host name.

**4.** Click **Apply** to save the changes.

## DHCP Connections

To view a list of computers currently recognized by the DHCP server, click **Connection List** at the bottom of the IP Address Distribution screen. The "DHCP Connections" screen appears.



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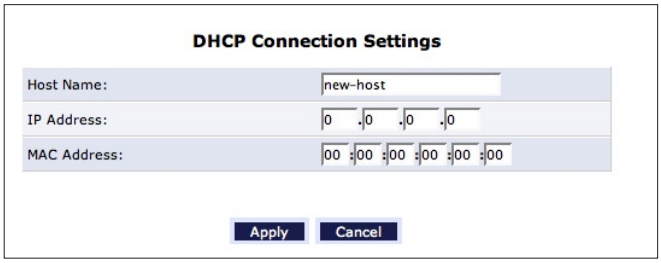
To define a new connection with a fixed IP address:

1. Click **New Static Connection** in the DHCP Connections screen. The "DHCP Connection Settings" screen appears.




2. Enter a host name for this connection.
3. Enter the fixed IP address to assign to the computer.
4. Enter the MAC address of the computer's network card.
5. Click the **Apply** to save changes.

☞ ***Note:*** A device's fixed IP address is actually assigned to the specific network card's MAC address installed on the network computer. If this network card is replaced, the device's entry in the DHCP Connections list must be updated with the new network card's MAC address.

To remove a host from the table, click the appropriate "Delete" icon in the Action column.



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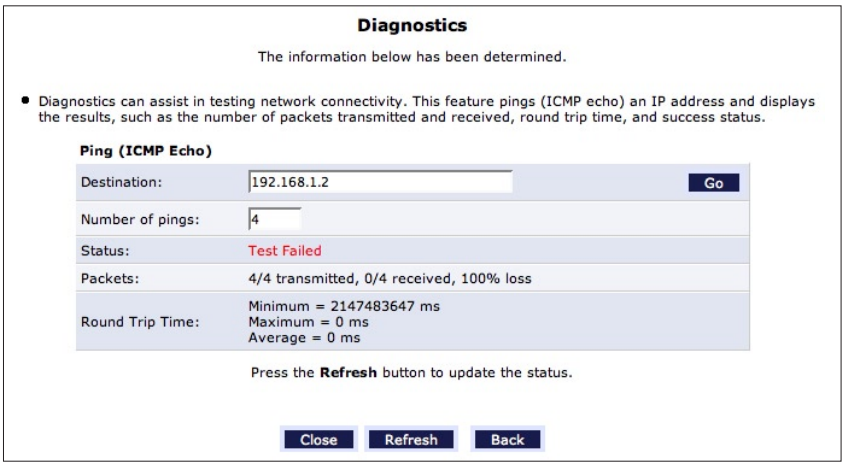
## Diagnostics

The Diagnostics screen can assist in testing network connectivity. This feature pings (ICMP echo) an IP address and displays the results, such as the number of packets transmitted and received, round trip time, and success status.

To diagnose network connectivity:

1. Click **Diagnostics** from the Advanced screen. The "Diagnostics" screen appears.


Diagnostics
The information below has been determined.
Diagnostics can assist in testing network connectivity. This feature pings (ICMP echo) an IP address and displays the results, such as the number of packets transmitted and received, round trip time, and success status.
Ping (ICMP Echo)
Destination:
192.168.1.2
Go
Number of pings:
4
Status:
Test Failed
Packets:
4/4 transmitted, 0/4 received, 100% loss
Round Trip Time:
Minimum = 2147483647 ms
Maximum = 0 ms
Average = 0 ms
Press the Refresh button to update the status.
Close
Refresh
Back

2. Enter the IP address or domain name to be tested in the "Destination" field.

3. Click **Go**.

4. In a few seconds, diagnostics statistics will be displayed. If no new information is displayed, click **Refresh**.



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## Restoring Default Settings

If the Router's factory default settings need to be restored (to build a new network from the beginning, for example), use the following procedure:

1. Click **Restore Defaults** in the Advanced screen. The "Restore Defaults" screen appears.

Restore Defaults
Attention
The following items will be set to default:
User Defined Settings
Network Connections (All connected DHCP clients will need to request new IP addresses)
Also, Wireless Broadband Router will have to reboot.
Are you sure you want to restore Wireless Broadband Router manufacturer defaults?
Apply
Cancel

2. Click **Apply** to restore the Router's factory default settings.

> ***Note:*** All of the Router's settings and parameters will be restored to their default values after performing the Restore Default procedure. This includes the administrator password; a user-specified password will no longer be valid.

## Reboot the Router

To reboot the Router:

1. Click **Restart** in the Advanced screen. The "Restart" screen appears.

2. Click **OK** to restart the Router. This may take up to one minute.

To reenter the MegaControl Panel after restarting the Router, click the web browser's "Refresh" button.



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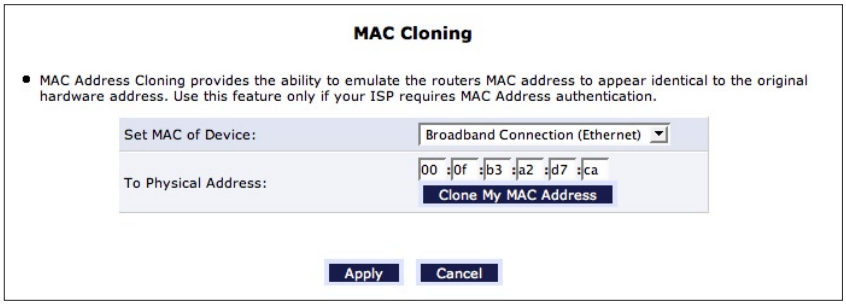
## MAC Cloning

A MAC (Media Access Control) address is a unique hexadecimal code that identifies a device on a network. All networkable devices have a MAC address. When replacing another network device with the Router, the installation process can be simplified by copying the MAC address of the existing computer to the Router. To do this:

1. Click **MAC Cloning** in the Advanced screen. The "MAC Cloning" screen appears.

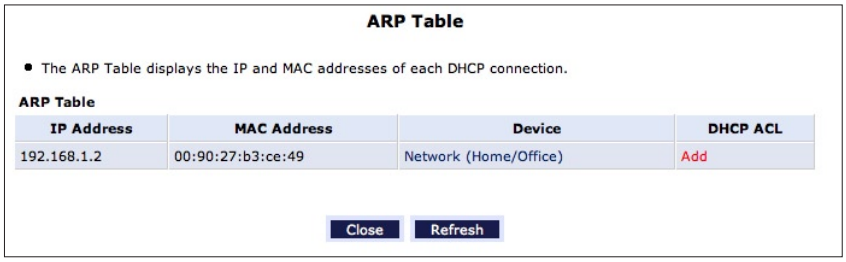

MAC Cloning
MAC Address Cloning provides the ability to emulate the routers MAC address to appear identical to the original hardware address. Use this feature only if your ISP requires MAC Address authentication.
Set MAC of Device:
Broadband Connection (Ethernet)
To Physical Address:
00 :0f :b3 :a2 :d7 :ca
Clone My MAC Address
Apply
Cancel

2. Enter the **MAC** address to be cloned in the "To Physical Address" text boxes.

3. Click **Apply** to capture the MAC address of the computer currently accessing the MegaControl Panel. The Router will now have the new MAC address.

## ARP (Address Resolution Protocol) Table

Clicking **ARP Table** in the Advanced screen generates the "ARP Table" screen. This screen displays the IP and MAC addresses of each DHCP connection.



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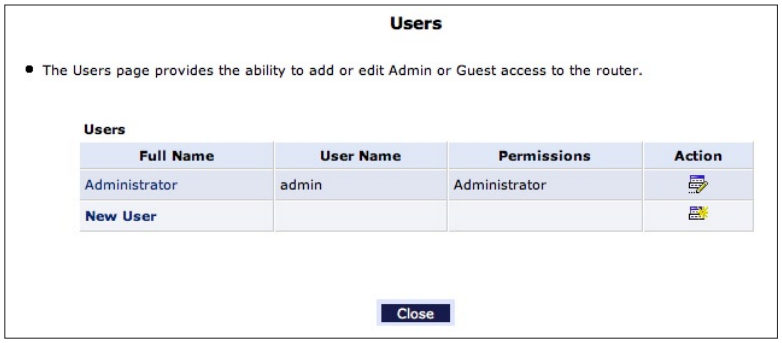
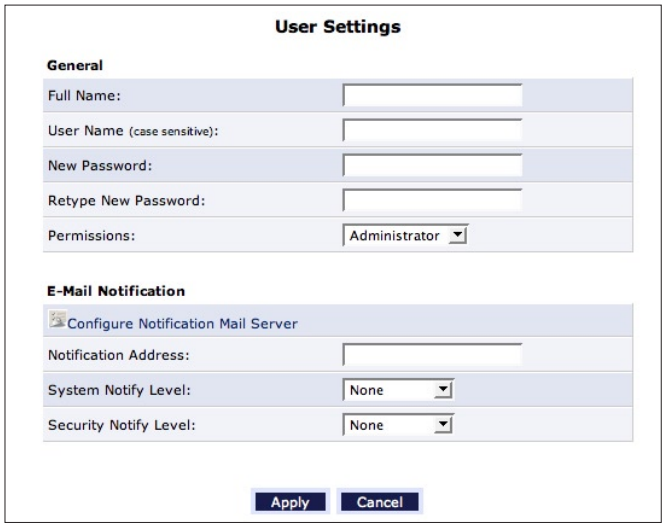
## Users

To manage individual users:

1. Click **Users** in the Advanced screen, which generates the "Users" screen.




2. Click **New User**, which generates the "User Settings" screen.




When adding a user, specify the following parameters:

- **Full Name** - The user's full name.
- **User Name** - The name a remote user will use to access the home or office network. This entry is case-sensitive.
- **New Password/Retype New Password** - The password for the user (and enter again to confirm).
- **Permissions** - The level of access the user is allowed. Options include **Administrator** or **Limited**.



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- **E-mail Notification** - E-mail notification can be used to receive indications of system events for a predefined severity classification. The available types of events are "System" or "Security" events. The available severity of events are **Error**, **Warning**, and **Information**.

  To configure E-mail notification for a specific user:

  1. Make sure an outgoing mail server has been configured in "System Settings". If not, click **Configure Notification Mail Server** to configure the outgoing mail server.
  2. Enter the user's E-mail address in the "Notification Address" text box.
  3. Select the "System" and "Security" notification levels in the "System Notify Level" and "Security Notify Level" drop-down lists.

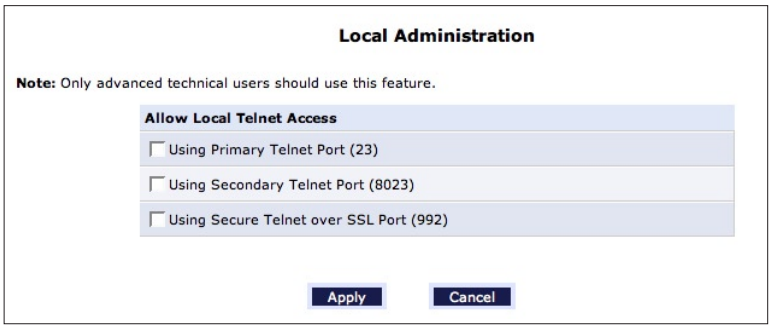
☞ ***Note:*** Changing any of the user parameters will prompt the connection associated with the user to terminate. For changes to take effect, activate the connection manually after modifying user parameters.

## QoS

The Router's QoS (Quality of Service) capabilities are covered in detail in Appendix A of this manual.

## Local Administration

Clicking **Administration** in the Advanced screen generates the "Administration" screen. This screen allows the user to allow local Telnet access using a particular Telnet port.


Local Administration
Note: Only advanced technical users should use this feature.
Allow Local Telnet Access
Using Primary Telnet Port (23)
Using Secondary Telnet Port (8023)
Using Secure Telnet over SSL Port (992)
Apply
Cancel

To use, select a Telnet port by clicking in the appropriate check box, then click **Apply**.



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## Remote Administration

The Router's Remote Administration capabilities are covered in detail in the "Security" chapter of this manual.

## Dynamic DNS

Dynamic DNS (Domain Name Server) a dynamic IP address to be aliased to a static hostname, allowing a computer on the network to be more easily accessible from the Internet. Typically, when connecting to the Internet, the service provider assigns an unused IP address from a pool of IP addresses, and this address is used only for the duration of a specific connection. Dynamically assigning addresses extends the usable pool of available IP addresses, while maintaining a constant domain name. This allows to user to access a device (a camera, for example) from a remote location, since the device will always have the same IP address.

When using Dynamic DNS, each time the IP address provided by the ISP changes, the DNS database changes accordingly to reflect the change. In this way, even though the IP address of the computer changes often, its domain name remains constant and accessible.

### Opening a Dynamic DNS Account

To use Dynamic DNS, a free Dynamic DNS account must be opened at http://www.dyndns.org/account/create.html.

When applying for an account, a user name and password must be specified. Have them available when customizing the Router's Dynamic DNS feature. For more information regarding Dynamic DNS, refer to http://www.dyndns.org.



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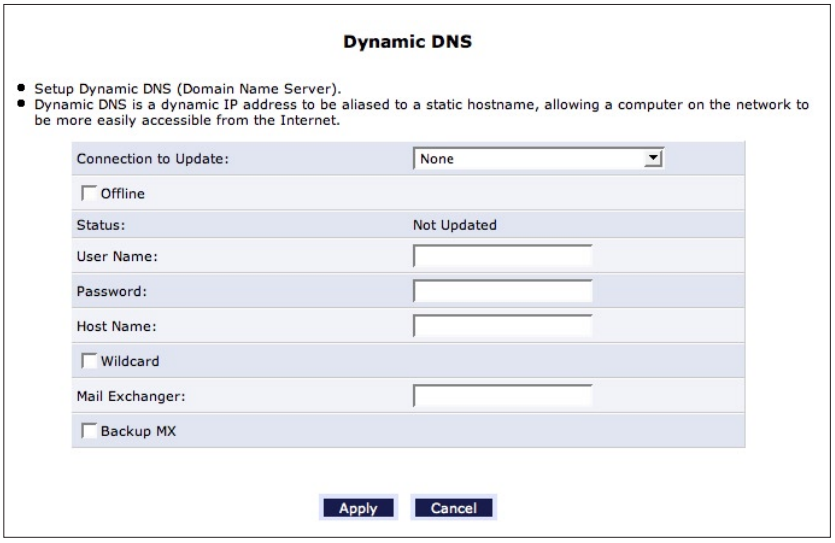
## Setting up Dynamic DNS

To set up Dynamic DNS on the Router, click **Dynamic DNS** in the Advanced screen. The "Dynamic DNS" screen appears.




Configure the following parameters:

### *Connection To Update*

Select the connection with which to couple the Dynamic DNS service. Options include **Broadband Connection (Ethernet)**, **Broadband Connection (Coax)**, and **WAN PPPoE**.

### *Offline*

Disable the Dynamic DNS feature by clicking this check box. This feature is available only to users who have purchased some type of upgrade credit from Dyndns.org. Note that changing the redirection URL can only be performed via the Dynamic DNS website.

### *User Name*

Enter the Dynamic DNS user name in this text box.

### *Password*

Enter the Dynamic DNS password in this text box.



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### *Host Name*

Enter the full Dynamic DNS domain in this text box.

### *Wildcard*

Select the "Wildcard" check box to have any URL that includes the domain name (here.yourhost.dyndns.org, for example) to connect.

### *Mail Exchanger*

Enter the mail exchange server address. This will redirect all E-mails arriving at the Dynamic DNS address to the mail server.

### *Backup MX*

Select this check box to designate the mail exchange server to be a backup server.

## DNS Server

The Domain Name System (DNS) translates domain names into IP addresses and vice versa. The Router's DNS server is an auto-learning DNS, which means that when a new computer is connected to the network, the DNS server learns its name and automatically adds it to the DNS table. Other network users can immediately communicate with this computer using either its name or its IP address.

The Router's DNS also provides the following services:

- Shares a common database of domain names and IP addresses with the DHCP server.
- Supports multiple subnets within the local network simultaneously.
- Automatically appends a domain name to unqualified names.
- Allows new domain names to be added to the database using the MegaControl Panel.
- Permits a computer to have multiple host names.
- Permits a host name to have multiple IPs (needed if a host has multiple network cards).



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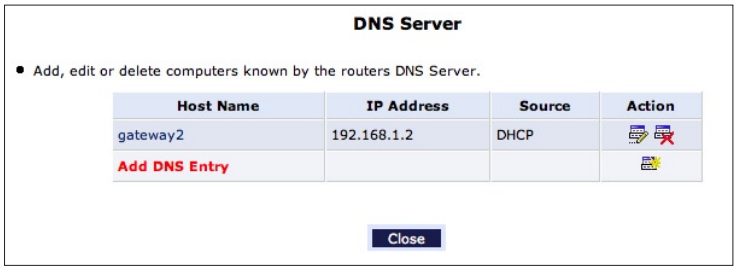
The DNS server does not require configuration. However, the list of computers known by the DNS can be viewed, the host name or IP address of a computer on the list can be changed, or a new computer can be added to the list.

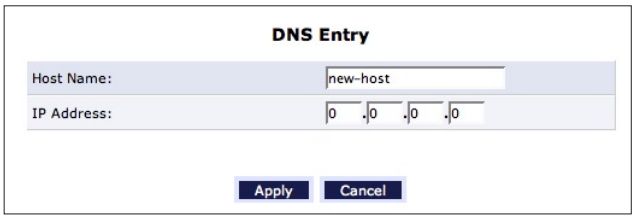
## DNS Table

To view the list of computers stored in the DNS table, click **DNS Server** in the Advanced screen. The "DNS Server" screen appears.




To add a new entry to the list:

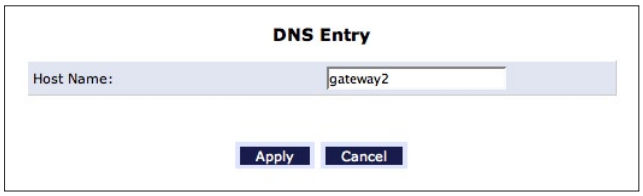
1. Click **New DNS Entry** in the DNS Server screen. The "DNS Entry" screen appears.




2. Enter the computer's host name in the "Host Name" text box.
3. Enter the computer's IP address in the "IP Address" text boxes.
4. Click **Apply** to save the changes.

To edit the host name or IP address of an entry:

1. Click the appropriate "Edit" icon in the Action column. The "DNS Entry" screen appears.



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2. If the host was manually added to the DNS Table, its host name and/or IP address can be modified. Otherwise, only modify its host name.

3. Click **Apply** to save the changes.

To remove a host from the DNS table:

Click the appropriate "Delete" icon in the Action column. The entry will be removed from the table.

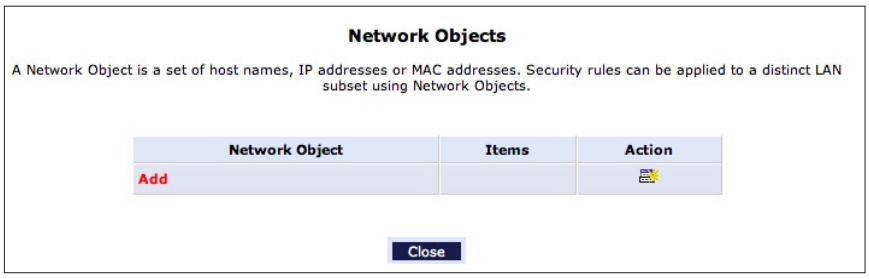
## Network Objects

Network objects is used to define a part of the Router's network (a group of computers, for example) by MAC addresses, IP addresses, and/or host names. The defined part becomes a "network object," and settings, such as configuring system rules, can be applied to all the devices defined as part of the network object at once. For example, instead of setting the same website filtering configuration to five computers one at a time, the computers can be defined as a network object, and website filtering configuration can then be applied to all the computers simultaneously.

Network objects can be used to apply security rules based on host names instead of IP addresses. This may be useful, since IP addresses change from time to time. Moreover, it is possible to define network objects according to MAC addresses, making rule application more persistent against network configuration settings.

To define a network object:

1. Click **Network Objects** in the Advanced screen. The "Network Objects" screen appears.


Network Objects
A Network Object is a set of host names, IP addresses or MAC addresses. Security rules can be applied to a distinct LAN subset using Network Objects.
Network Object
Items
Action
Add
Close



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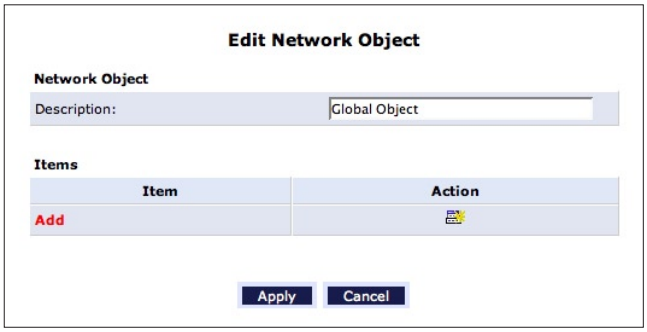
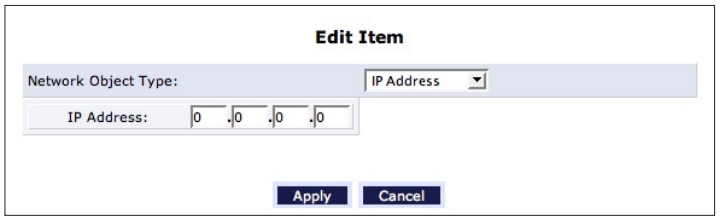
2. Click **Add**. The "Edit Network Object" screen appears.




3. Specify a name for the network object in the "Description" text box.

4. Click **Add**. The "Edit Item" screen appears.



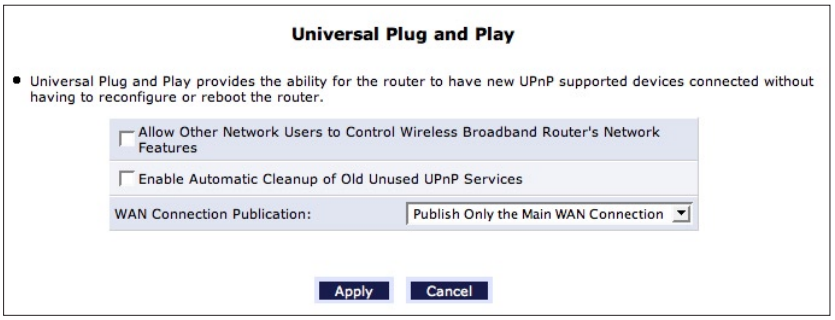

5. Select the type of network object type from the "Network Object Type" list box. Options include IP address, IP Subnet, IP Range, MAC Address, and Host Name.

6. Repeat to create other network objects, if needed. When finished, click **Apply** to save all created network objects.

## Universal Plug and Play (UPnP)

To access the UPnP settings perform the following:

1. Click **Universal Plug and Play** in the Advanced screen. The "Universal Plug and Play" settings screen appears.


Universal Plug and Play
Universal Plug and Play provides the ability for the router to have new UPnP supported devices connected without having to reconfigure or reboot the router.
Allow Other Network Users to Control Wireless Broadband Router's Network Features
Enable Automatic Cleanup of Old Unused UPnP Services
WAN Connection Publication:
Publish Only the Main WAN Connection
Apply
Cancel



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2. Click in the "Allow Other Network Users to Control Wireless Broadband Router's Network Features" check box to enable UPnP and allow UPnP services to be defined on any of the network hosts.

3. Click in the "Enable Automatic Cleanup of Old Unused UPnP Services" check box to enable automatic cleanup of invalid rules. When enabled, this feature checks validity of all the UPnP services and rules every five minutes. Any old and not used UPnP defined service is removed, unless any user defined rule depends on it. Since there is a maximum limitation on the number of UPnP defined services (256), enable the cleanup feature if the limit is in danger of being exceeded.

4. Select whether all WAN connections, or only the main WAN connection, will have UPnP active, from the "WAN Connection Publication" drop-down list.

UPnP services are not deleted when disconnecting a computer without proper shut-down of the UPnP application (e.g. messenger). Thus, if running a boingo, services may often not be deleted, and will eventually lead to exhaustion of rules and services, and no new services can be defined. In this scenario, the cleanup feature will find the invalid services and remove them, preventing services exhaustion.



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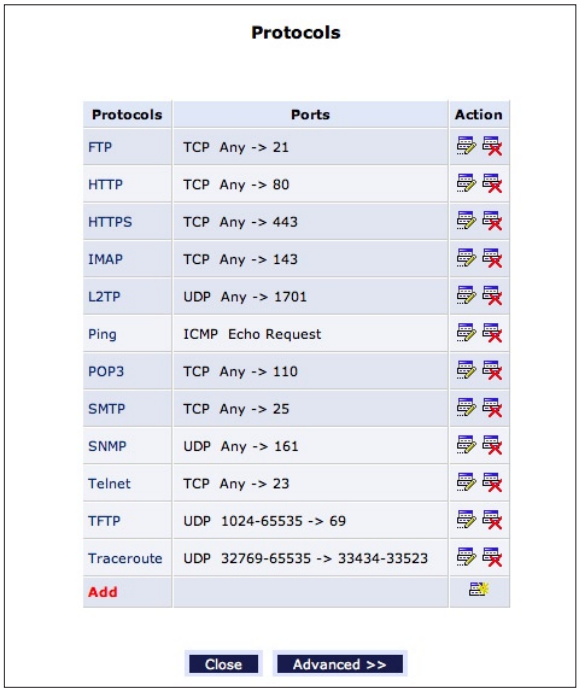
## Protocols

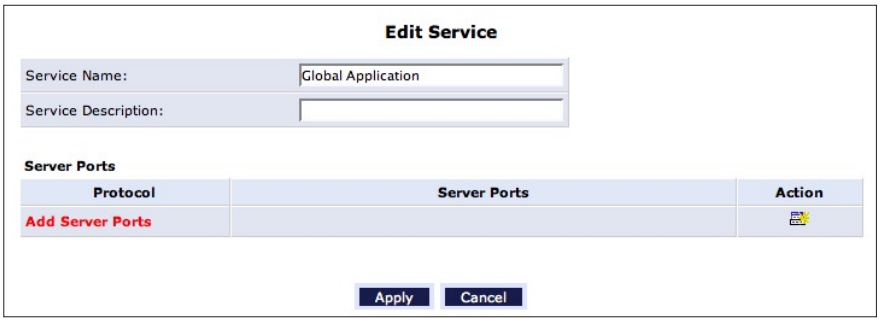
Protocols features a list of preset and user-defined applications and common port settings. Protocols can be used in various security features, such as Access Control and Port Forwarding. New protocols can be added to support new applications or existing ones can be edited when needed.

To define a protocol:

1. Click **Protocols** in the Advanced screen. The "Protocols" screen appears.




2. Click **Add** at the bottom of the screen. The "Edit Service" screen appears.



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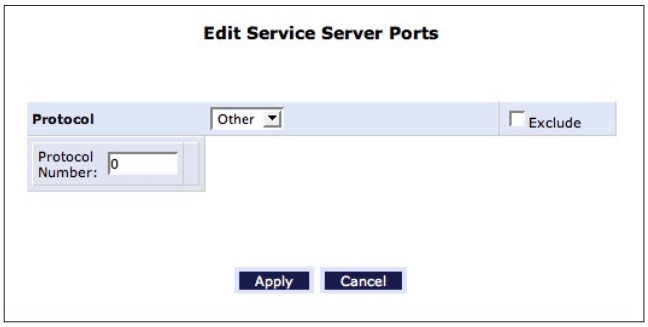
3. Name the service in the "Service Name" text box and, if needed, enter a description of the service in the "Service Description" text box, then click **Add Service Ports**. The "Edit Service Server Ports" screen appears.




4. Select a protocol from the "Protocol" drop-down list. To create a new protocol, select "Other." After selecting a protocol, the screen will refresh, displaying the relevant text boxes needed to edit the particular protocol.

5. Click **Apply** to save the changes.



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# Monitoring the Router

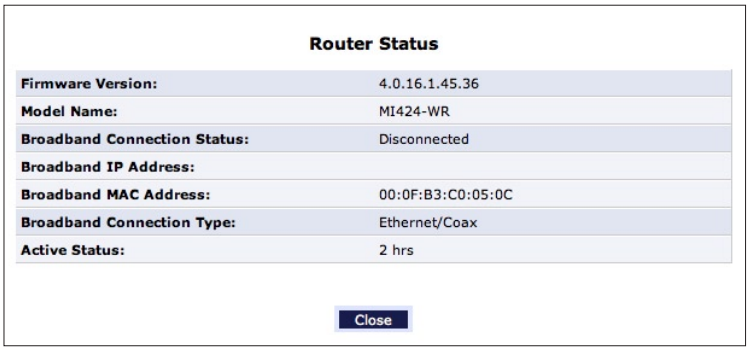
# 9

The Wireless Broadband Router's System Monitoring screens display important system information, including:

- Basic Router settings
- System log
- Key network device parameters
- Network traffic statistics

## Router Status

Click **System Monitoring** at the top of the Home screen to display the "Router Status" screen, which displays the Router's basic settings.



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## System Log

Click **System Monitoring** in any of the Monitoring screens to display the "Advanced Status" screen, then click **System Logging** to generate the screen shown below. The System Log displays a list of the most recent activities of the Router.

System Log
Close
Clear Log
Save Log
Refresh
Press the Refresh button to update the data.
Time
Event
Event-Type
Details
Jan 2 21:26:34 2003
System Log
Message
kern.debug Clink Link Down (freq timer) [repeated 5 times, last time on Jan 2 21:26:39 2003]
Jan 2 21:26:34 2003
System Log
Message
daemon.warn cLink: clink1: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.
Jan 2 21:26:20 2003
System Log
Message
kern.debug Clink Link Down (freq timer) [repeated 13 times, last time on Jan 2 21:26:33 2003]
Jan 2 21:26:20 2003
System Log
Message
daemon.warn cLink: clink0: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.
Jan 2 21:26:04 2003
System Log
Message
kern.debug Clink Link Down (freq timer) [repeated 13 times, last time on Jan 2 21:26:19 2003]
Jan 2 21:26:04 2003
System Log
Message
daemon.warn cLink: clink0: ioctl(DRV_GET_MY_NODE_INFO) failed, res=-1: Bad address.
Jan 2 21:26:00 2003
System Log
Message
kern.debug Clink Link Down (freq timer) [repeated 4 times, last time on Jan 2 21:26:03 2003]



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## Connection Monitoring

1. Click **System Monitoring** in any of the Monitoring screens to display the "Advanced Status" screen, then click **Full System/System-wide Monitoring of Connections** to generate the screen shown below, which features a table summarizing the monitored connection data.

2. Click **Refresh** to update the table, or click **Automatic Refresh On** to constantly update the displayed parameters.

**Full Status/System wide Monitoring of Connections**

**NOTE:** Only advanced technical users should use this feature

| Name | Network (Home/Office) | Broadband Connection (Ethernet) | Ethernet | Broadband Connection (Coax) | Coax | Wireless Access Point | WAN PPPOE | WAN PPPOE 2 |
|---|---|---|---|---|---|---|---|---|
| Device Name | br0 | ixp0 | ixp1 | clink0 | clink1 | ra0 | ppp0 | ppp1 |
| Status | Connected | Down | Connected | DHCP IP Address Released | Down | Connected | Disabled | Disabled |
| Network | LAN | WAN | LAN | WAN | LAN | LAN | WAN | WAN |
| Underlying Device | Ethernet Wireless Access Point Coax | | | | | | Broadband Connection (Ethernet) | Broadband Connection (Coax) |
| Connection Type | Bridge | Ethernet | Hardware Ethernet Switch | Coax Link Ethernet | Coax Link Ethernet | Wireless Access Point | PPPoE | PPPoE |
| MAC Address | 00:0f:b3:a2:d7:c6 | 00:0f:b3:a2:d7:ca | 00:0f:b3:a2:d7:c7 | 00:0f:b3:a2:d7:cb | 00:0f:b3:a2:d7:c8 | 00:0d:f0:1d:00:cc | | |
| IP Address | 192.168.1.1 | | | | | | | |
| Subnet Mask | 255.255.255.0 | | | | | | | |
| IP Address Distribution | DHCP Server | Disabled | Disabled | Disabled | Disabled | Disabled | | |
| Service Name | | | | | | | | |
| User Name | | | | | | | qa2@local | qa2@local |
| Received Packets | 11835 | 0 | 8760 | 0 | 0 | 1427922 | | |
| Sent Packets | 845051 | 0 | 614542 | 0 | 0 | 233910 | | |
| Time Span | 70:27:09 | 70:27:09 | 70:27:09 | 70:27:09 | 70:27:09 | 70:27:09 | | |
| Channel | | | | Disconnected | Disconnected | | | |

Close | Automatic Refresh Off | Refresh



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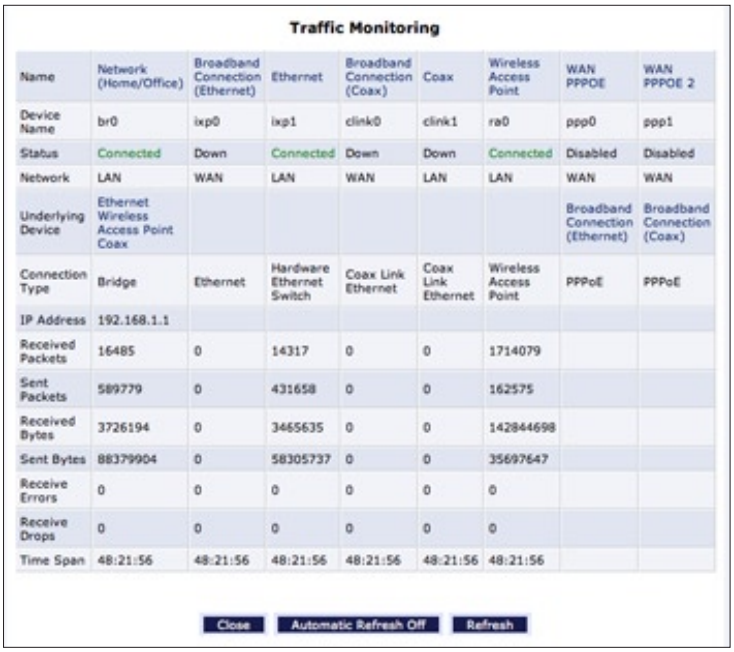
## Traffic Monitoring

The Router constantly monitors traffic within the local network and between the local network and the Internet. To view up-to-the-second statistical information about data received from and transmitted to the Internet, and about data received from and transmitted to computers in the local network, click **Traffic Monitoring** in the Advanced Status screen. This generates the "Traffic Monitoring" screen.



**Traffic Monitoring**

| Name | Network (Home/Office) | Broadband Connection (Ethernet) | Ethernet | Broadband Connection (Coax) | Coax | Wireless Access Point | WAN PPPOE | WAN PPPOE 2 |
|---|---|---|---|---|---|---|---|---|
| Device Name | br0 | ixp0 | ixp1 | clink0 | clink1 | ra0 | ppp0 | ppp1 |
| Status | Connected | Down | Connected | Down | Down | Connected | Disabled | Disabled |
| Network | LAN | WAN | LAN | WAN | LAN | LAN | WAN | WAN |
| Underlying Device | Ethernet Wireless Access Point Coax | | | | | | Broadband Connection (Ethernet) | Broadband Connection (Coax) |
| Connection Type | Bridge | Ethernet | Hardware Ethernet Switch | Coax Link Ethernet | Coax Link Ethernet | Wireless Access Point | PPPoE | PPPoE |
| IP Address | 192.168.1.1 | | | | | | | |
| Received Packets | 16485 | 0 | 14317 | 0 | 0 | 1714079 | | |
| Sent Packets | 589779 | 0 | 431658 | 0 | 0 | 162575 | | |
| Received Bytes | 3726194 | 0 | 3465635 | 0 | 0 | 142844698 | | |
| Sent Bytes | 88379904 | 0 | 58305737 | 0 | 0 | 35697647 | | |
| Receive Errors | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Receive Drops | 0 | 0 | 0 | 0 | 0 | 0 | | |
| Time Span | 48:21:56 | 48:21:56 | 48:21:56 | 48:21:56 | 48:21:56 | 48:21:56 | | |

Close | Automatic Refresh Off | Refresh



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# Troubleshooting 10

This chapter contains a list of problems that may be encountered while using the Wireless Broadband Router, and techniques to try and overcome the problem. Note that these techniques may not solve the problem (or problems).

### *Accessing the Router if Locked Out*

If the Router's connection is lost while making configuration changes, a setting that locks access to the MegaControl Panel may have inadvertantly been activated. There are three common ways to lock access to the Router:

Scheduler If a schedule has been created that applies to the computer over the connection being used, the Router will not be accessible during the times set in the schedule. To regain access, either wait until the connection is scheduled to be active again, or restore the default settings to the Router.

LAN Firewall If the firewall setting for the local network is set to maximum, no computers from the network will be able to connect to the Router. To gain access, restore the default settings to the Router.

Access Control If the access control setting for the computer is set to block the computer, access to the Router will be denied. To gain access, restore the default settings to the Router.

### *Restoring the Router's Default Settings*

There are two ways to restore the Router's default settings. The first is to use the tip of a ballpoint pen and depress the "Reset" button on the back of the Router for at least ten seconds. The second is to access the Router's MegaControl Panel and navigate to the "Advanced Settings" screen. Click on "Restore Defaults" and read the instructions on-screen. Note that after performing either of these two procedures, all previously saved settings on the Router will be lost.



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### *LAN Connection Failure*

- Ensure the Router is properly installed, the LAN connections are correct, and the power is on.
- Confirm the computer and Router are on the same network segment. If unsure, let the computer get the IP address automatically by initiating the DHCP function, then verify the computer is using an IP address within the default range (192.168.1.2 through 198.168.1.254). If the computer is not using an IP address within the range, it will not connect to the Router.
- Ensure the Subnet Mask address is set to 255.255.255.0.

### *Time out error occurs when entering a URL or IP Address*

- Verify all the computers are working properly.
- Ensure the IP settings are correct.
- Ensure the Router is on and connected properly.
- Verify the Router's settings are the same as the computer.

### *I've run out of Ethernet ports on my Router. How do I add more computers?*

Plugging in an Ethernet hub or switch expands the number of ports on the Router. Run a standard Ethernet cable from the "Uplink" port of the new hub or switch to a yellow Ethernet port on the Router.

### *How do I change the password on the Router's Graphic User Interface?*

From the Router's GUI Home screen, click **Advanced**, then **Users**. From the "Users" screen, click **Administrator**, which generates the "User Settings" screen. In the "General" section of the screen, change the password.

### *Is the wireless option on by default on the Router?*

Yes. The Router's wireless option is activated out of the box.

### *Is the wireless security on by default when the wireless option is activated?*

Yes, with a unique 64-bit WEP (Wired Equivalent Privacy) key for each unit.

### *Which connection speeds does the Router support?*

The Ethernet Internet connection supports 100 Mbps. The 802.11g wireless connection supports up to 54 Mbps (depending on signal quality, etc.). The MoCA connection supports 270 Mbps.



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### *Are the Router's Ethernet ports auto-sensing?*

Yes. Either a straight-through or crossover Ethernet cable can be used.

### *Can I use an 802.11b wireless card to connect to the Router?*

Yes, the Router can interface with 802.11b cards or 802.11g cards. The 802.11g standard is backward compatible with the 802.11b standard. The Router can be setup to handle just "g" wireless cards, just "b" wireless cards, or both.

### *Can my wireless signal pass through floors, walls, and glass?*

The physical environment surrounding the Router can have a varying effect on signal strength and quality. The more dense the object (a concrete wall compared to a plaster wall, for example), the greater the interference. Concrete or metal-reinforced structures will experience a higher degree of signal loss than those made of wood, plaster, or glass.

### *How do I find out what IP address my computer is using?*

Windows 95, 98, 98SE, and Me - Select **Start**, **Run**, and type "winipcfg." Press **Enter**. When the "Winipcfg" window appears, ensure your network device is selected.

Windows NT, 2000, and XP - Select **Start**, **Run** and type "cmd." Press **Enter**. When the command screen appears, type "ipconfig" and press **Enter**.

### *My computer cannot connect to the Internet via MoCA. What should I do?*

First, check the connection, and make sure all cables are connected correctly. Then make sure the NIM is still connected, and check the Ethernet connection to the NIM from the computer. A computer cannot be connected directly via a MoCA cable; it must go through a NIM to connect. The NIM converts the MoCA signal to an Ethernet signal the computer can understand.

### *I used DHCP to configure my network. Do I need to restart my computer to refresh my IP address?*

No. Follow these steps to refresh the IP address:

Windows 95, 98, 98SE, and Me - Select **Start**, **Run**, type "winipcfg," and press **Enter**. Ensure the Ethernet adapter is selected in the device box. Press the **Release_all** button, then press the **Renew_all** button.

Windows NT 4.0 and 2000 - Select **Start**, **Run**, type "cmd," and press **Enter**. At the DOS prompt, type "ipconfig /release," then type "ipconfig /renew."

Windows XP - Unplug the Ethernet cable or wireless card and plug it back in.



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### *I cannot access the Router's Graphical User Interface? What should I do?*

If you cannot access the Router's Graphical User Interface, make sure the computer connected to the Router is set up to dynamically receive an IP address.

### *I have an FTP or Web server on my network. How can I make it available to users on the Internet?*

For a Web server, enable port forwarding for port 8088 to the IP address of the server and set up the Web server to receive on that port, as well. (Configuring the server to use a static IP address is recommended.)
For an FTP server, enable port forwarding for port 21 to the IP address of the server. (Configuring the server to use a static IP address is recommended.)

### *How many computers can be connected through the Router?*

The Router is capable of 254 connections, but it is recommended to have no more than 45 connections. As you increase the number of connections, you decrease the available speed for each computer.

### *What is the default user name for the Router?*

The default user name for the router is "admin" and the default password is "password" (all lower case, no quotation marks). When logging into the Router the first time (or after restoring the Router's default settings), the user is asked to create a new user name and password after entering the default user name and password. Enter the new user name and password, write them down on a piece of paper, and keep it in a safe place. The new user name and password will be needed to access the Mega Control Panel in the future.



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# Quality of Service

# A

Network-based applications and traffic are growing at a high rate, producing an ever-increasing demand for bandwidth and network capacity. For obvious reasons, bandwidth and capacity cannot be expanded infinitely, requiring that bandwidth-demanding services be delivered over existing infrastructure, without incurring additional expensive investments. The next logical means of ensuring optimal use of existing resources are Quality of Service (QoS ) mechanisms for congestion management and avoidance.

Quality of Service refers to the capability of a network device to provide better service to selected network traffic. This is achieved by shaping the traffic and processing higher priority traffic before lower priority traffic.

***STOP!*** Do not change any Quality of Service settings unless instructed to do so by the ISP.

## Traffic Priority

Traffic Priority manages and avoid traffic congestion by defining inbound and outbound priority rules for each device on the Router. These rules determine the priority that packets, traveling through the device, will receive. QoS parameters (DSCP marking and packet priority) are set per packet, on an application basis.

QoS can be configured using flexible rules, according to the following parameters:

- Source/destination IP address, MAC address, or host name
- Device
- Source/destination ports
- Limit the rule for specific days and hours

The Router supports two priority marking methods for packet prioritization:

- DSCP
- 802.1p Priority



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The matching of packets by rules is connection-based, known as Stateful Packet Inspection (SPI), using the Router's firewall mechanism. Once a packet matches a rule, all subsequent packets with the same attributes receive the same QoS parameters, both inbound and outbound. Connection-based QoS also allows inheriting QoS parameters by some of the applications that open subsequent connections. For instance, QoS rules can be defined on SIP, and the rules will apply to both control and data ports (even if the data ports are unknown). Applications that support such inheritance have an ALG in the firewall. They are:

- SIP
- MSN Messenger/Windows Messenger
- TFTP
- FTP
- MGCP
- H.323
- Port triggering applications
- PPTP
- IPSec



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## Setting Priority Rules

To set priority rules:

1. Click **Quality of Service** in the Advanced screen. The "Traffic Priority" screen appears. This screen is divided into two identical sections, one for "QoS input rules" and the other for "QoS output rules," which are for prioritizing the inbound and outbound traffic, respectively. Each section lists all the devices on which rules can be set. Rules can be set on all devices at once by clicking **Add** in the "All Devices" row.

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2. After choosing the traffic direction and the device on which to set the rule, click **Add** in the appropriate row. The "Add Traffic Priority Rule" screen appears.

Set the following parameters:

**Source Address** - The source address of the packets sent to or received from the network object. To add an address:

1. Select **Specify Address** from the drop-down list. The screen refreshes and an "Add" link appears.

2. Click **Add**, then add a new network object (see the "Advanced Settings" chapter to learn how to add a network object). Clicking Add is the same as clicking "New Entry" in the "Network Objects" screen.

**Destination Address** - The destination address of the packets sent to or received from the network object. This address can be configured in the same manner as the source address.

**Protocol** - Choose a specific traffic protocol from the drop-down list, or add a new one. To add a new traffic protocol:

1. Select **Specify Address** from the drop-down list. The screen refreshes and an "Add" link appears.

2. Click **Add**, and add a new protocol (see the "Advanced Settings" chapter to learn how to add a protocol). Note that clicking Add is equivalent to clicking "New Entry" in the "Protocols" screen.



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**Set Priority -** Activate this check box to add a priority to the rule. The screen will refresh, allowing a selection between one of eight priority levels, zero being the lowest and seven the highest (each priority level is mapped to low/medium/high priority). This sets the priority of a packet on the connection matching the rule, while routing the packet.

**Set DSCP** - Activate this check box to mark a DSCP value on packets matching a connection that matches this rule. The screen will refresh, allowing the user to enter the Hex value of the DSCP.

**Log Packets Matched by This Rule** - Check this check box to log the first packet from a connection matched by this rule.

**Schedule** - By default, the rule will always be active. However, scheduler rules can be configured to define time segments during which the rule may be active.

## Traffic Shaping

Traffic Shaping is the solution for managing and avoiding congestion where the network meets limited broadband bandwidth. Typical networks use a 100 Mbps Ethernet LAN with a 100 Mbps WAN interface router. This is where most bottlenecks occur

A traffic shaper is essentially a regulated queue that accepts uneven and/or bursty flows of packets and transmits them in a steady, predictable stream so that the network is not overwhelmed with traffic. While traffic priority allows basic prioritization of packets, traffic shaping provides more sophisticated definitions, such as:

- Bandwidth limit for each device
- Bandwidth limit for classes of rules
- Prioritization policy
- TCP serialization on a device

Additionally, QoS traffic shaping rules can be defined for a default device. These rules will be used on a device that has no definitions of its own. This enables the definition of QoS rules on the default WAN, for example, and their maintenance even if the PPP or bridge device over the WAN is removed.



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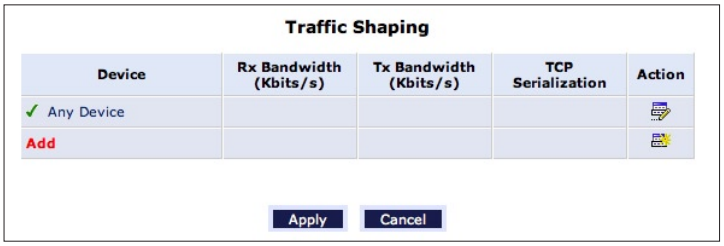
## Device Traffic Shaping

This section describes the different Traffic Shaping screens and terms, and presents the feature's configuration logic.

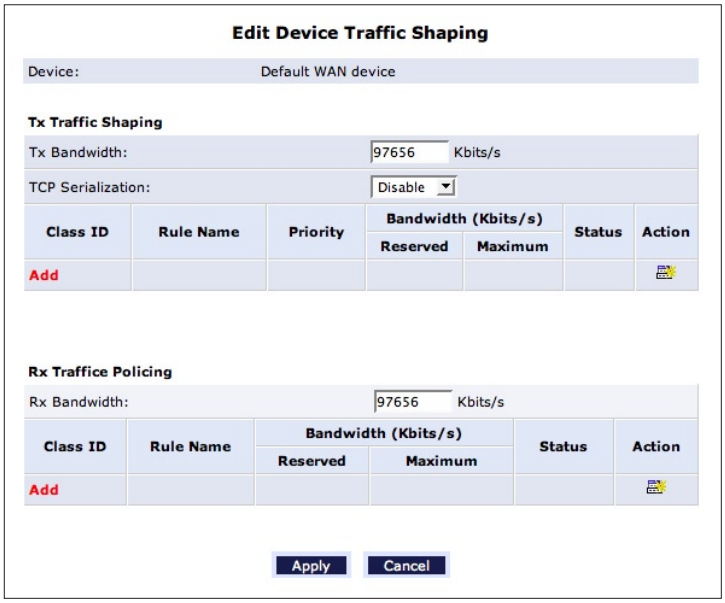
1. Click **Quality of Service** in the Advanced screen, then click **Traffic Shaping**. The following screen appears.




2. Click **Add**. The "Add Device Traffic Shaping" screen appears.

3. Select the device for which the traffic will be shaped. The drop-down list includes all the Router's devices, as well as the option to select all devices in each category (e.g., "All LAN Devices," "All WAN Devices"). In this example, select the default WAN device option.

4. Click **Apply**. The "Edit Device Traffic Shaping" screen appears.



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Configure the following parameters:

**Tx Bandwidth -** Tx bandwidth limits the Router's bandwidth transmission rate. The purpose is to limit the bandwidth of the WAN device to that of the weakest outbound link.. This forces the Router to be the network bottleneck, where sophisticated QoS prioritization can be performed.

**Rx Bandwidth** - In the same manner, this Rx bandwidth limits the Router's bandwidth reception rate.

**TCP Serialization** - Enable TCP Serialization from its drop-down list, either for active voice calls only or for all traffic. The screen will refresh, adding a "Maximum Delay" text box. This function allows the maximum allowed transmission time frame (in milliseconds) of a single packet to be defined. Any packet requiring a longer time to be transmitted will be fragmented to smaller sections. This avoids transmission of large, bursty packets that can cause delay or jitter for real-time traffic, such as VoIP.

## Shaping Classes

The bandwidth of a device can be divided to reserve constant portions of bandwidth to predefined traffic types. Such a portion is known as a shaping class. When not used by its predefined traffic type or owner (for example VoIP), the class will be available to all other traffic. However, when needed, the entire class is reserved solely for its owner. Also, the maximum bandwidth that a class uses can be limited, even if the entire bandwidth is available.

When a shaping class is defined for a specific traffic type, two shaping classes are created. The second class is the "Default Class", which is responsible for all the packets that do not match the defined shaping class, or any other classes that might be defined on the device. This can be viewed in the "Class Statistics" screen.



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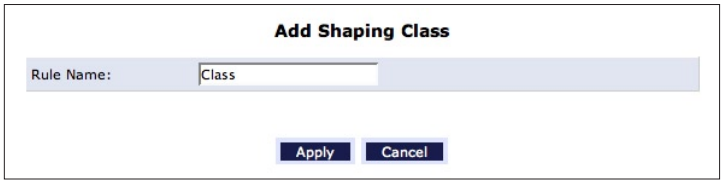
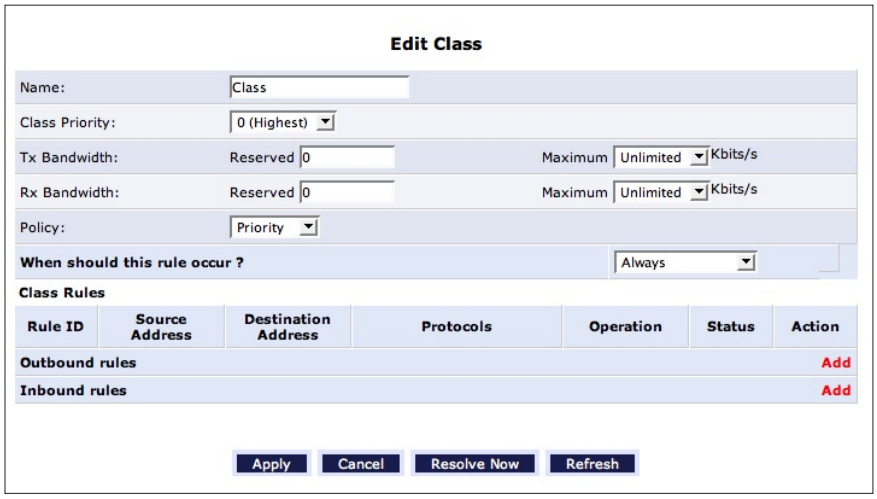
To define a shaping class:

1. Click **Add** in the "Tx Traffic Shaping" section of the Edit Device Traffic Shaping screen. The "Add Shaping Class" screen appears.




2. Name the new class and click **Apply**.

3. Click the class name to edit the shaping class. The "Edit Class" screen appears.




Configure the following parameters:

**Name** Enter the name of the class in this text box.

**Class Priority** The class can be granted one of eight priority levels, zero being the highest and seven the lowest (opposite the rules priority levels). This level sets the priority of a class in comparison to other classes on the device.

**Tx Bandwidth** Tx bandwidth is the reserved transmission bandwidth in kilobits per second. The maximum allowed bandwidth can be limited by selecting **Specify** from the drop-down list. The screen will refresh, adding another "Kbits/s" text box. Enter the desired maximum allowed bandwidth.

**Rx Bandwidth** In the same manner, Rx bandwidth is the reserved reception bandwidth, which can also be limited to a maximum allowed bandwidth.



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**Policy** The class policy determines the policy of routing packets inside the class. Select one of four options:

- **Priority** - Priority queuing utilizes multiple queues, so that traffic is distributed among queues based on priority. This priority is defined according to packet's priority, which can be defined explicitly, by a DSCP value, or by an 802.1p value.
- **FIFO** - The "First In, First Out" priority queue. This queue ignores any previously-marked priority the packets may have.
- **Fairness** - The fairness algorithm ensures no starvation by granting all packets a certain level of priority.
- **RED** - The RED (Random Early Detection) algorithm utilizes statistical methods to drop packets in a "probabilistic" way before queues overflow. Dropping packets in this way slows a source down enough to keep the queue steady and reduces the number of packets lost when a queue overflows and a host is transmitting at a high rate.

**Schedule** By default, the class will always be active. However, scheduler rules can be configured to define time segments during which the class may be active.

**Class Rules** Class rules define which packets belong to the class. They must be defined in order to associate packets that meet them with the shaping class. Without class rules, the shaping class will have no effect. Each class can have outbound and/or inbound rules for outgoing and incoming traffic, respectively. For example, all outgoing packets from computer A in the network can be defined as belonging to the VoIP class. These packets will be limited to the class settings (bandwidth, schedule, etc.). In addition, the traffic protocol and priority for each rule can be defined (this is not mandatory as it is with Traffic Priority rules).



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To add a new outbound/inbound class rule, click **Add** in the Edit Class screen. The "Add Traffic Priority Rule" screen appears.

**Source Address** - The source address of the packets sent to or received from the network object (computer A in the above example). To add an address:

1. Select **Specify Address** from the drop-down list. The screen will refresh and an "Add" link appears.

2. Click **Add**, and add a new network object. Note that clicking Add is equivalent to clicking "New Entry" in the "Network Objects" screen.

**Destination Address** - The destination address of the packets sent to or received from the network object. This address can be configured in the same manner as the source address.

**Protocol** - Select a specific traffic protocol from the drop-down list, or add a new one. To add a new traffic protocol:

1. Select **Specify Protocol** from the drop-down list. The screen will refresh and an "Add" link appears.

2. Click **Add**, and add a new protocol. This is the same as clicking "New Entry" in the "Protocols" screen.

**DSCP** -Use this drop-down list to mark a DSCP value on packets matching a connection that matches this rule. To do so, select **Specify** from the drop-down list and enter the hexadecimal value of the DSCP.



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**Set Priority** - Activate this check box to add a priority to the rule. The screen will refresh, allowing a selection of one of eight priority levels, zero being the lowest and seven the highest (each priority level is mapped to low/medium/high priority). This sets the priority of a packet on the connection matching the rule, while routing the packet.

**Log Packets Matched by This Rule** - Check this check box to log the first packet from a connection that was matched by this rule.

**When should this rule occur?** - By default, the rule will always be active. However, scheduler rules can be configured to define time periods during which the rule is active. To learn how to configure scheduler rules, see the "Advanced Settings" chapter.

***Note:*** The hierarchy of the class rules is determined by the addition order to the class. For example, if the first rule is "match packets with any source address, any destination address, and any protocol to this class," all packets traveling through Router will be associated with the specific class. Any rules defined later will not have any effect.

## Ingress Data

The Router can control outgoing data fairly easily. It can queue packets, delay them, give precedence to other packets, or drop them. This helps in resolving upload (Tx) traffic bottlenecks, and in most cases is sufficient. However, in the case of download (Rx) traffic bottlenecks, the ability to control the flow is much more limited. The Router cannot queue packets, since in most cases the local network (LAN) is much faster then the Internet (WAN), and when the Router receives a packet from the Internet, it passes it immediately to the local network.

QoS for ingress data has the following limitations, which do not exist for outgoing data:

- QoS can only be applied to TCP streams (UDP streams cannot be delayed)
- No borrowing mechanism
- When reserving Rx bandwidth, it is strictly taken from the bandwidth of all other classes



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Furthermore, the Router cannot control the behavior of the ISP, which may not have proper QoS handling. Unfortunately, this is a common situation. Let's look at a scenario of downloading a large file and surfing the Internet at the same time. Downloading the file is distinguished by small requests, followed by very large responses. This may result in blocking HTML traffic at the ISP. A solution for such a situation is limiting the bandwidth of low-priority TCP connections (such as the file download).

## Differentiated Services Code Point Settings

In order to understand what DSCP is, one must first be familiarized with the Differentiated Services model.

Differentiated Services (Diffserv) is a Class of Service (CoS) model that enhances best-effort Internet services by differentiating traffic by users, service requirements, and other criteria. Packets are specifically marked, allowing network nodes to provide different levels of service, as appropriate for voice calls, video playback, or other delay-sensitive applications, via priority queuing or bandwidth allocation, or by choosing dedicated routes for specific traffic flows.

Diffserv defines a field in IP packet headers referred to as the Differentiated Services Codepoint (DSCP). Hosts or routers passing traffic to a Diffserv-enabled network will typically mark each transmitted packet with an appropriate DSCP. The DSCP markings are used by Diffserv network routers to appropriately classify packets and to apply particular queue handling or scheduling behavior

The Router provides a table of predefined DSCP values, which are mapped to 802.1p priority marking method. Any of the existing DSCP setting can be edited or deleted, and new entries can be added.



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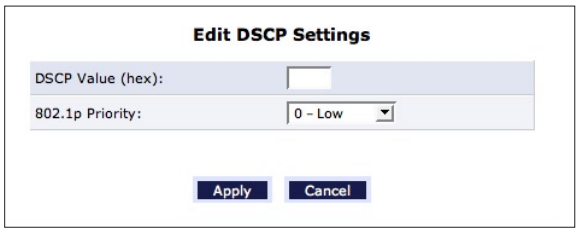
1. Click Quality of Service at the top of the Home screen, then click **DSCP Settings**. The "DSCP Settings" screen appears.

2. To edit an existing entry, click the appropriate icon in the "Action" column. To add a new entry, click **Add**. In either case, the "Edit DSCP Settings" screen appears.




3. Configure the following parameters:

**DSCP Value (hex)** - Enter the DSCP value as a hexadecimal value.

**802.1p Priority** - Select a 802.1p priority level from the drop-down list, zero being the lowest and seven the highest (each priority level is mapped to low/medium/high priority). The default DSCP value for packets with an unassigned value is zero.

4. Click **Apply** to save the settings.



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## 802.1p Settings

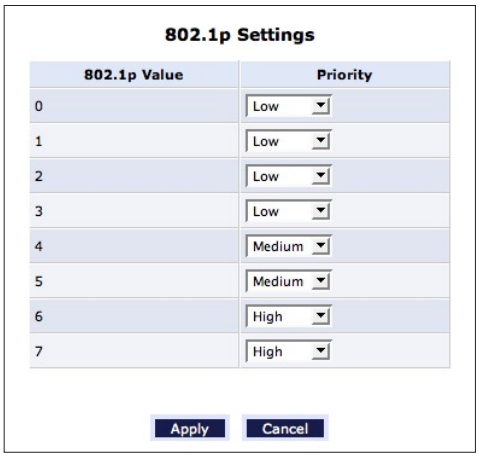
The IEEE 802.1p priority marking method is a standard for prioritizing network traffic at the data link/Mac sub-layer. 802.1p traffic is simply classified and sent to the destination, with no bandwidth reservations established.

The 802.1p header includes a 3-bit prioritization field, which allows packets to be grouped into eight levels of priority. By default, the highest priority is seven, which might be assigned to network-critical traffic. Values five and six may be applied to delay-sensitive applications such as interactive video and voice. Data classes four through one range from controlled-load applications down to "loss eligible" traffic. Zero is the value for unassigned traffic and used as a best effort default, invoked automatically when no other value has been set.

A packet can match more than one rule. This means that:

- The first class rule has precedence over all other class rules (scanning is stopped once the first rule is reached).
- The first traffic-priority (classless) rule has precedence over all other traffic priority rules.
- There is no prevention of a traffic-priority rule conflicting with a class rule. In this case, the priority and DSCP setting of the class rule (if given) will take precedence.

1. Click **Quality of Service** in the Advanced screen, then click **802.1p Settings**. The "802.1p Settings" screen appears.



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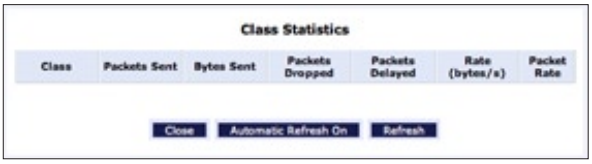
2. The eight 802.1p values are pre-populated with the three priority levels: Low, Medium, and High. These levels can be changed for each of the eight values in their respective drop-down lists.

3. Click **Apply** to save the settings.

## Class Statistics

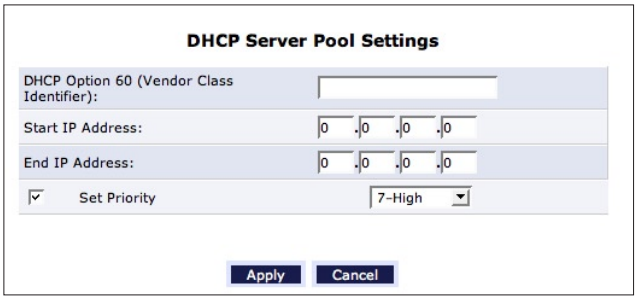
The Router provides accurate, real-time information on the traffic moving through the defined device classes. For example, the amount of packets sent, dropped, or delayed are just a few of the parameters monitored per each shaping class.

To view class statistics, click **Quality of Service** at the top of the Home screen, then click **Class Statistics**. The following screen appears. Note that class statistics will only be available after defining at least one class (otherwise the screen will not present any information).




## Class Identifier

To create a class identifier, click **Quality of Service** in the Advanced screen, then click **Class Identifier**. The "DHCP Server Pool Settings" screen appears.




Enter the information needed in the appropriate text boxes, then click **Apply**.



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# Specifications

# B

## General

### Model Number

MI424WR (4-Port Wireless Broadband Router)

### Standards

IEEE 802.3x
IEEE 802.3u
IEEE 802.11b, g (Wireless)

### IP

IP version 4

### MoCA

Two channels (WAN, LAN)
WAN MoCA frequency: 975 MHz - 1025 MHz (single channel)
LAN MoCA frequency: 1125 MHz - 1425 MHz (6 channel)

### Firewall

ICSA certified

### Speed

**LAN Ethernet**: 10/100 Mbps auto-sensing
**Wireless**: 802.11g 54 Mbps optimal (see "Wireless Operating Range" for details)

### Cabling Type

**Ethernet 10BaseT**: UTP/STP Category 3 or 5
**Ethernet100BaseTX**: UTP/STP Category 5



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## Wireless Operating Range

### Indoors

Up to 91 M (300 ft.)

### Outdoors

Up to 533 M (1750 ft.)

### Topology

Star (Ethernet)

## LED Indicators

Power, Ethernet WAN, Ethernet LAN (4), Coax WAN, Coax LAN, Internet, Wireless

## Environmental

### Power

External, 5V DC, 3A

### Certifications

FCC Part 15, UL-60959-1

### Operating Temperature

0º C to 40º C (32º F to 104º F)

### Storage Temperature

-20º C to 70º C (-4º F to 158º F)

### Operating Humidity

8% to 93% (non-condensing)

### Storage Humidity

5% to 100% (non-condensing)

***Note***: Specifications are subject to change without notice.



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# Notices

## Regulatory Compliance Notices

### Class B Equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by implementing one or more of the following measures:

- Reorient or relocate the receiving antenna;
- Increase the separation between the equipment and receiver;
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected;
- Consult the dealer or an experienced radio or television technician for help.

## Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by A*ction*tec Electronics, Inc., may void the user's authority to operate the equipment.

Declaration of conformity for products marked with the FCC logo – United States only.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference;



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**2.** This device must accept any interference received, including interference that may cause unwanted operation.

☞ ***Note***: To comply with FCC RF exposure compliance requirements, the antenna used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

For questions regarding your product or the FCC declaration, contact:

*Action*tec Electronics, Inc.
760 North Mary Ave.
Sunnyvale, CA 94086
United States
Tel: (408) 752-7700
Fax: (408) 541-9005



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